A Study on Effective Inventory Management of Bangladesh Railway

Dissertation submitted in partial fulfillment of the requirements for the Degree of Masters in Procurement and Supply Management

Submitted by

Md. Moazzaim Hossain Majumder
MPSM, Batch II
ID- 14282007

Masters in Procurement and Supply Management

February 2015

BRAC Institute of Governance and Development,
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DECLARATION

It is hereby declared that this dissertation or any part of it has not been submitted elsewhere for the award of any degree or diploma.

February, 2015

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CERTIFICATE

This is my pleasure to certify that the dissertation entitled ***"Effective Inventory Management of Bangladesh Railway"*** is the original work of Md. Moazzaim Hossain Majumder that is completed under my direct guidance and supervision. So far I know, the dissertation is an individual achievement of the candidate's own efforts, and it is not a conjoint work. I also certify that I have gone through the draft and final version of the dissertation and found it satisfactory for submission to the BRAC Institute of Governance and Development (BIGD), BRAC University in partial fulfillment of the requirements for the degree of Masters in Procurement and Supply Management.

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ACKNOWLEDGEMENT

I, at the commencement of drafting this study report, express my sincere gratitude to Almighty Allah who gave me the strength to complete the task. I express my sincere and heartiest gratitude to my supervisor Dr. Md. Reaz Akter Mullick, Assistant Professor, Department of Civil Engineering, Chittagong University of Engineering and Technology (CUET) for his constant inspiration, enormous patience and affectionate guidance to complete the report.

I am extending my gratitude to Dr. Zahurul Islam, Academic Coordinator, BIGD, BRAC University and Dr. Nazneen Ahmed whose valuable suggestions and support throughout the entire program stimulated us.

I am grateful to all of my colleagues of Bangladesh Railway who have helped me by giving various important data regarding inventory management. Their co-operation help me a lot and makes easier to represent this internship report.

I am also extending my special thanks to all officers and employees of the Bangladesh Institute of Governance and Development (BIGD), BRAC University for giving me direct and indirect help to complete the report.

Finally but immensely, I would like to extend my thanks to the Bangladesh Institute of Governance and Development (BIGD), BRAC University, Dhaka for giving me the opportunity to select the topic.

Chittagong
December 04, 2014 **Md.Moazzaim Hossain Majumder**

Executive Summary

Bangladesh Railway is a pure Government owned organization. Its responsibility is to provide safe, reliable, comfortable and timely journey. To meet this responsibility Bangladesh Railway needs improved track, modern locomotives, carriages & wagons and trained manpower, which would make Railway a profitable organization. However the condition of track is very worse; age of maximum locomotives, carriages & wagons is more than 50 years. Bangladesh Railway is facing severely multi-dimensional problems such as negligence by Government regarding investment caused less development in this sector compare to Roads & Highways (RHD), inefficient management, complexity in taking timely decision, widespread corruption, lack of commitment among the employees, outdated technology etc. make it a losing organization. To invigorate the operational activity, it is very much necessary to introduce improved track, new locomotives, carriages & wagon. Also regular maintenance of old rolling stock can be used to improve the operational activity. To ensure the uninterrupted maintenance work in the workshop, various spare parts need to supply as per requirements. Implementing effective inventory management ensures the maintenance work regularly and keeps the production in the workshop according to forecasted demand maintaining dead stock at minimum level, in this Study report, tools and implementation of effective inventory along with its evolution and the present condition of inventory followed in Bangladesh Railway are described very clearly that can help a reader to understand the importance of effective inventory management and compare it with the prevailing situation in Bangladesh Railway. Finally some recommendations are made to improve the present losing situation of Bangladesh Railway.

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ABBREVIATION AND ACRONYMS

ACCS/P	-	Additional Chief Controller of Stores
ACST	-	Annual Contract Statement
AMC	-	Average Monthly Consumption
BR	-	Bangladesh Railway
BRASS	-	Bangladesh Railway Automated Support System.
BRTC	-	Bangladesh Road Transport Corporation
BSCIC	-	Bangladesh Small And Cottage Industries Corporation
CCS/PHT	-	Chief Controller of Stores/Pahartali.
CIDA	-	Canadian International Development Agency
COS/E	-	Controller of Stores/East, Chittagong
COS/W	-	Controller of Stores/West, Rajshahi
CLS	-	Card Ledger Section
CLW	-	Central Locomotive Workshop Depot
DA	-	Dhaka Diesel Depot
DIC/CRB	-	Director of Inventory Control/CRB
DCOS/G	-	District Controller of Stores/General
DCOS/P1	-	District Controller of Stores/Purchase-1
DCOS/P2	-	District Controller of Stores/Purchase-2
DCOS/INSP	-	District Controller of Stores/Inspection
DCOS/SHIP	-	District Controller of Stores/Shipping
DCOS/PHT	-	District Controller of Stores/Pahartali
DCOS/CLW	-	District Controller of Stores/Central Locomotive Workshop
DCOS/SDP	-	District Controller of Stores/Saidpur
DDIC/CRB	-	Deputy Director of Inventory Control/CRB
F & G	-	Maintenance Schedule F & G
FIFO	-	First In First Out
GOH	-	General Over Haul
KNNR	-	Kanchan Nagar Depot
LC	-	Letter of Credit
PBT	-	Parbatipur Diesel Depot
PD	-	Pending Demand

PHT	-	Pahartali General Depot
PHT/DL	-	Pahartali Diesel Depot
PS	-	Present Stock
Qty	-	Quantity
ROL	-	Re-Order Level (Level At Which Procurement Start)
REOPT	-	Re-Order Point
ROQ	-	Re-Order Quantity
SAE	-	Sub Assistant Engineer
SDP	-	Saidpur Depot
SSAE	-	Senior Sub Assistant Engineer
SR	-	Stock Recoupment
BIGD	-	Bangladesh Institute of Governance and Development.

CHAPTER ONE

OVERVIEW OF THE STUDY

CHAPTER-1
OVERVIEW OF THE STUDY

1.1 Introduction

There are several modes of communication system in Bangladesh. But Railway is most vital and important among them. Rail communication is considered as safe in compare to other modes of communication system. People in general prefer rail communication for long journey. Materials for state security are carried through rail system. Besides, goods carrying cost is less in railway than other mode of transportation, Govt. as well as private sector therefore, prefer railway for carrying goods, food grains and other crucial items.

Inefficiencies in the inventory control inhibit the formal development from performing the proper intermediation service which has adverse effects on the development of an organization. Bangladesh Railway performs one basic function like Provide transportation service to the inhabitants of the country. Government of Bangladesh expends lot of money to provide this communication service. To perform this job the organization need permanent way, carriage, locomotives, signaling equipment and electrical equipment. For uninterrupted train communication service, these equipment should operate properly. This needs proper maintenance of the equipment and logically some inventory is essential for proper maintenance of the same.

The experiences of developed countries industry sector regarding inventory control is better. The management of the organizations careful about excess inventory. The management always thinks about optimal level of inventory. Huge blockage in inventory causes loss of revenue, on the other hand, shortage of materials cause hamper of maintenance program as well as service to the consumer. For inventory control at its optimal level, the management should always careful about opportunity cost of the money that block for inventory and the loss due to shortage of the inventory. For want of a spare the production unit may remain closed and for that labor remain idle and causes loss of revenue.

1.2 Background of the study

This paper mainly focuses the status of inventory management practiced in Bangladesh Railway. Particularly, it highlights the impact of inefficient inventory management. It also briefly discusses background of inventory management and Just-In-Time (JIT) inventory management system. It is important in the sense that after reading the paper, everybody will able to realize about the effective inventory management and JIT inventory management system and what is following presently in Bangladesh Railway in relating to inventory management.

1.3 Research Problem

The major problem of Bangladesh Railway in relation to production in various workshops is inventory management. Sufficient inventory helps an organization to produce products according to the requirement of the consuming departments. But in this case Bangladesh Railway faces severe problem. Before every production in each workshop, the Works Manager (WM)'s of each workshop prepare a schedule and make a list of required materials. On the basis of this list Stores department prepares another list indicating the materials in the Present Stock (PS) and Out of Stock (O/S). Some of the items are found Out of Stock which certainly hinders production in the workshop.

When demands come in the various depots of stores department, each depot prepares Stock Recoupment (SR) where 9 (Nine) months is taken as lead-time. Lead-time is the required time from the preparation of SR to procure and reach the materials to the depots. But it is found that in most of the cases of procurement of materials, lead-time cannot be maintained effectively and it is seen that lead-time becomes actually 2 to 3 times of the original ones. So, there creates a deadlock in the production of various important materials. Sometimes the used materials whose life has already finished can be used to the repair works. Sometimes the WM's purchase materials locally from BSCIC (the quality of BSCIC materials is very poor in most of the cases and life is about one-third or bellow compared to foreign materials) in order to keep the production running from the same suspense budget. But initiatives of purchasing the materials have been taken previously. As a result, same material is purchased in two times, which creates a surplus of materials and finally capital block. In fact every depot faces huge amount of capital block due to surplus materials. The other probable causes are as follows:

- Lack of prudence to predict about the future requirement.
- Change of design, standard, specification of certain materials.
- Instant reduction of usage of certain materials.
- Declaration of obsolesces of certain materials.
- Inadequate information from consuming department about a material, which will not be used or replaced in the future though, its procuring process, is going on.
- Lack of efficiency of Stores Department Personnel, etc.

1.4 Objectives of the study

The overall objective of the study is to analyze and evaluate the existing inventory system of Bangladesh Railway.

Following are the specific objectives of the study:

- ❑ To highlight the historical background of stores department.
- ❑ To identify the objectives and function of stores department.
- ❑ To identify the operational problems of inventory management.
- ❑ To evaluate the efficiency of the inventory management.
- ❑ To provide some remedial suggestions.

1.5 Methodology

The organizational part is based on a critical review of both primary and secondary data. Primary data is obtained by using interview method while the secondary data is collected from various publications and annual reports of Bangladesh Railway. In addition, information collected from departmental database is used to complement and enrich the secondary published data in order to reach a logical conclusion. The whole study has covered the period from 2004 to 2013. To justify the performance of the Organization, after collecting data, the processed information or calculated ratios or trends are compared among the periods under consideration as well as the level of performance to the standard organization regarding different indicators of inventory control performance evaluation. Thus the performance of the organization regarding inventory is compared to the other organization and analyzed to make a reasonable suggestion to improve the situation. Besides, for improvement of the storing system, from the collected data, a suggestion to be made for improvement.

- **Primary Data**

I have visited various depot, workshop and collected information by interviewing employees, shop and depot in-charges, from the senior, retired and knowledgeable persons and railway officials who are conversant with the railways.

- **Secondary Data**

The sources of secondary data are as follows:

1. Annual Information Book of Bangladesh Railway.
2. Reports of CIDA.
3. Different books and periodicals related to inventory management.
4. Internets.
5. "BRASS" Software of The Inventory Control of Bangladesh Railway etc.

1.6 Rationale of the study

- This report will be helpful to get a scenario of strength and inefficiencies of Bangladesh Railway inventory control system.
- If recommendations stated in the report take into account, Bangladesh Railway will be benefited by increasing efficiency in its inventory control system.

1.7 Scope of the report

The scope of this study is limited to stores department of Bangladesh Railway. Specifically it is limited to the operations and management of stores and inventory department of Bangladesh Railway. In this study storing system inventory, stock re-coupment system, Procurement system of inventory and over all quality control and transportation system of the inventory are covered.

1.8 Limitations of the study

This particular subject is extremely extensive in nature. Because of its widespread nature and time limitation I have worked only on inventory control side. So performance of the department may not depict the total scenario of the inventory control. On the other hand, this report tries to concentrate only on the financial performance issues, while evaluation of the performance measures also requires some other considerations. Lack of appropriate measurement yardstick and complexity of the inter-links of the consumer and the inventory management and information availability constitutes one of the major

limitations of this report. Last but not the least, the financial information was collected from secondary sources and the accuracy could not be verified which might cause deviation from the reality if this information is not correct.

Major Limitations at a glance

1. There is fund constraint because data collection, report preparation and all relevant expenses has completely borne by the student.
2. There was time constraints because we have been given only two months time to submit the report.
3. Lack of spontaneous cooperation to provide information/data from various sources/groups.

CHAPTER TWO

PROFILE OF BANGLADESH RAILWAY

CHAPTER-2

PROFILE OF BANGLADESH RAILWAY

2.1 Origin

2.1.1 Bangladesh Railway at a glance

Bangladesh Railway, a principle transportation agency of the country, is a Government-owned and Government–managed organization. It covers a length of 2,878 route kilometers employing a total of 25,939 regular employees. As railway is a very important mode of inland transport, linking the entire length and breadth of the country, it's healthy grow naturally contributes to the economic development of the country.

Till June 2, 1982, the management and development of railway was vested with a Railway Board, comprising of a Chairman and four members. But, for administrative convenience and operational reason the Railway Board was abolished with effect from June 3, 1982 and the function of the Railway Board was vested with the Railway Division of the Ministry of Communications with the Secretary of the Division working as the Director General of Bangladesh Railway. For the same purpose the Railway bifurcated into two zones, East and West, under the administrative control of two general managers, who are accountable to the Director General of Bangladesh Railway. Subsequently on August 12, 1995 the day to day operation of the Railway was separated from the Ministry and entrusted with director general drawn from the Railway professionals. For policy guidance, a 9(nine) member Bangladesh Railway authority (BRA) was formed with the Minster Ministry of Communications as its Chairman. The Director General is assisted by Additional Director General and Joint Director General to perform all administrative and policy making jobs.

The General Managers of the two zones are assisted by various specialized departments who are responsible for operation, maintenance and financial management. Each zone is again divided in two divisions, which are the basic unit of operation. The division is headed by a Divisional Railway Manager, who is assisted by Divisional Officers of various specialized Departments such as Personnel, Transportation, Commercial, Finance Mechanical, Way and Works Signaling and Telecommunication, Electrical, Medical, Railway Nirapatta Bahini (RNB) etc. Besides there are two workshop Divisions, one in

each zone, located at Pahartali and Saidpur, each being headed by Divisional Superintendent. Further there is a locomotive workshop headed by Chief Executive at Parbatipur for general overhauling of both Broad Gauge (BG) and Meter Gauge (MG) locomotives.

Bangladesh Railway also has Railway Training Academy headed by a Rector, a planning cell headed by Chief Planning Officer, stores Department headed by a Chief Controller of Stores and Accounts Department headed by an Additional Director General/Finance for coordinating and advising Accounting and financial management activities of the two zones.

To ensure safety of Railway transportation Government has set up a separate Directorate under Ministry of Railway to inspect different works of BR relates with the train operation.

2.1.2 Some Historical Events

15 Nov. 1862 : Construction of 53.11 Km. of Broad Gauge line between Darsana and Jagati of Kushtia district by Eastern Bengal Railway.

1 Jan. 1871 : Extension of Darsana – Jagati railway line up to Goalundo by Eastern Bengal Railway.

1874-1879 : Construction of Metre Gauge railway line from Sara (near Paksey) to Chilahati, Parbatipur to Dinajpur and Parbatipur to Kaunia and construction of Broad Gauge railway line from Damukdia (Opposite to Sara) to Poradaha.

1882-84 : Bengal Central Railway Company constructed Benapole-Khulna Broad Gauge railway line.

1 Jul. 1884 : Government took over the management of Eastern Bengal Railway.

4 Jan. 1885 : Railway Metre Gauge connection between Dhaka and Narayanganj, a distance of 14.98 km. by Dhaka State Railway, which was later on merged with Eastern Bengal State Railway.

1885	**:**	Construction of Dhaka – Mymensingh railway section by Dhaka State Railway.
1 Apr. 1887	**:**	Eastern Bengal Railway was merged with Northern Bengal State Railway.
1891	**:**	Construction of the Assam – Bengal Railway taken up with British Government assistance but was later on taken over by Assam-Bengal Railway Company.
1 Jul. 1895	**:**	Opening of 149.89 km. Metre Gauge lines between Chittagong and Comilla and 50.89 km. Metre Gauge lines between Laksam and Chandpur by Assam Bengal Railway.
3 Nov. 1895	**:**	Chittagong to Chittagong port line was constructed.
1896	**:**	Construction of Metre Gauge line from Comilla to Akhaura and Akhaura to Karimganj.
1897	**:**	Single line section between Darsana and Poradaha converted into double line section.
1898-99	**:**	Mymensingh – Jaggannathganj Metre Gauge railway constructed.
1899-1900	**:**	Metre Gauge railway line constructed between Santahar Jn. To Fulchari by Brahmputra-Sultanpur Railway Company.
1903	**:**	Laksam – Noakhali section constructed by Noakhali (Bengal) Railway company.
1 April. 1904	**:**	Bengal Central Railway Company and Brahmputra-Sultanpur Railway Company taken over by Govt. managed Eastern Bengal Railway.
1905	**:**	Opening of Kaunia-Bonarpara Metre Gauge section. Govt. purchases the Noakhali (Bengal) Railway Company.
1 Jan. 1906	**:**	Noakhali (Bengal) Railway Company merged with Assam Bengal Railway.
1909	**:**	Poradaha-Bhairamara single line converted into double line.

1910-1914	**:**	Akhaura –Tongi section opened. Conversion of Shakole to Santahar Metre Gauge section into Broad Gauge.
1912-1915	**:**	Kulaura – Sylhet section opened.
1 Jan. 1915	**:**	Hardinge Railway Bridge was opened over the river Padma at Paksey.
1915-1916	**:**	Sara – Sirajganj line constructed by Sara – Sirajganj Railway Company.
1916	**:**	Bhairamara-Raita Broad Gauge section opened.
1912-1918	**:**	Gouripur – Mymensingh – Netrakona and Shamgonj –Jharia-janjail sections constructed by Mymensingh – Bhairab Bazar Railway Company.
1915-1932	**:**	Bhairamara – Ishurdi – Abdulpur single line section converted into double line.
10 Jun. 1918	**:**	Rupsha – Bagerhat Narrow Gauge section constructed by a Branch line Company.
Jul. 1924	**:**	Conversion of Santahar – Parbatipur Metre Gauge section into Broad Gauge.
Sep. 1926	**:**	Conversion of Parbatipur – Chilahati Metre Gauge section into Broad Gauge.
1928	**:**	Opening of Shaistaganj-Habiganj section.
1928-29	**:**	Tista – Kurigram Narrow Gauge section converted into Broad Gauge.
1929	**:**	Shaistaganj-Balla and Chittagong-Hathazari sections opened.
1930	**:**	Hathazari – Nazirhat Metre Gauge and Abdulpur – Amnura Broad Gauge sections opened.
1931	**:**	Sholashahar-Dohazari section opened.
6 Dec.1937	**:**	Opening of king VI George Bridge connecting Bhairab Bazar and Ashugonj over the river Meghna.
1941	**:**	Jamalpur-Bahadurabad Metre Gauge section opened.

1 Jan. 1942	**:**	Assam – Bengal Railway taken over by Government and amalgamated with the Eastern Bengal Railway under the name " Bengal and Assam Railway"
1 Oct. 1944	**:**	Government took over Sara-Sirajganj Railway Company.
1947	**:**	Bengal and Assam Railway was split up and the portion within the boundary of erstwhile East Pakistan was named as" Eastern Bengal Railway", the control remaining with Central Government of Pakistan.
1948-1949	**:**	Government takes over Mymensingh-Bhairab Bazar Rail way company and Rupsa-Bagerhat Branch Line Company.
21 Apr. 1951	**:**	Jessore-Darsana Railway line opened to traffic.
Oct. 1954	**:**	Sylhet to Chatak Bazar railway line opened to traffic.
1 Feb. 1961	**:**	Eastern Bengal Railway renamed as Pakistan Eastern Railway.
1962	**:**	A Rail way Board was formed and management of Railway was placed under the Provincial Govt.
1972	**:**	Pakistan Eastern Railway was renamed as Bangladesh Railway after emergence of Bangladesh as sovereign state and continued to function under a Railway Board.
3 Jun. 1982	**:**	The Railway Board was abolished and its function was placed under the control of Railway Division of Ministry of Communications with the Secretary of the Division being Director General. For administrative convenience and operational reasons, BR was bifurcated into two zones, East and West zone, headed by two General Managers.
12 Aug-1995	**:**	Bangladesh Railway Authority (BRA) was formed comprising 9 members with Hon'ble Minister for Ministry of Communications as Chairman, for giving policy guidance of Bangladesh Railway.

23 June-1998 : East-West Railway connectivity over the mighty river Jumana was established from the day one, the day of formal opening of Jamuna Multipurpose Bridge, after completion of construction of Broad Gauge track from Jamtoil to Ibrahimabad.

14Aug-2003 : Direct Communication between Dhaka (Joydebpur) and Rajshahi over Jamuna Multipurpose Bridge was established by introducing first Intercity passenger Train after completion of construction of new Dual Gauge track from Ibrahimabad to Joydebpur.

14April-2008 : Direct Communication between Dhaka and Kolkata was established by introducing "Maitree Express" Train.

4March-2008 : Introduction of ticket selling though mobile phone.

04 Dec.- 2011 Ministry of Railways formed by the Honorable Prime Minister under SRO-361-Rules of Business 1996 Rule-3.

2.1.3 Vision and Mission

To provide safe, reliable, cost effective and time efficient rail transport service in the country through modernizing, expanding and maintaining rail system in a manner which supports government strategies for economic, social and environmental development.

Mission:

- Develop and maintain railway tracks and station infrastructures throughout the country.
- Maintain and upgrade locomotives, coaches and other rolling stocks.
- Maintain and modernize signaling and interlocking system and Telecom system of Bangladesh Railway.
- Ensure safe, speedy and efficient train operation.
- Implement Government transport policy in rail sector.
- Procure modern technology related rolling stocks, Track materials and signaling systems suitable for Bangladesh Railway.
- Manage land asset of Bangladesh Railway.
- Ensure optimum utilization of Development Budget and Revenue Budget of Bangladesh Railway.

2.2 Services

BR is one of the largest Govt. enterprises in the country, playing a vital role in the socio-economic development and industrialization of the country. BR is expected to serve both as a commercial enterprise and as a public utility service. As a commercial enterprise, BR has an obligation to generate sufficient revenue to meet its cost and as a public utility service it has a special responsibility to provide transport facilities to large number of passengers and movement of essential commodities for mass consumption. BR is also required to provide transport facilities in emergent situations like flood, cyclone, draught etc. In addition, the Railway has to bear some costs in the matter of education and medical care of railway employees and their wards, deployment of police forces in railway premises, etc.

In discharging all these social obligations, BR has to bear certain cost burdens namely 'Social Cost'. Some important items of social cost are noted below.

- Carrying essential commodities and rendering transport facilities to passengers at lower prices than cost of services.
- Operation of un-economic branch lines.
- Carrying Relief Materials at concession rates.
- Carrying military traffic at less than normal tariff.

2.2.1 Compensation for Social Cost

BR is compensated under "Public Service Obligation (PSO)" system for operating specific services which are not commercially viable but socially necessary. This concept has been accepted by the Govt. which are being reflected in the Revenue Budget since 1993-94. This replaced the open-ended subsidy and BR has been able to cover its operating expenses.

2.3 Statistics

2.3.1 Number of Stations

Bangladesh Railway had a total of 444 stations at the end of the year 2013. These include one block hut, thirteen train halts and four goods booking points.

2.3.2 Number of trains/rolling stocks and their types

Number of passenger trains daily : 328

Number of freight trains daily : 49

Number of intercity trains : 75

Rolling Stocks

Bangladesh Railway now owns basically two types of locomotives viz Diesel Electric (DE) and Diesel Hydraulic (DH). The total fleet as on 30th June 2014 comprised 278 Diesel Electric (83 BG, 195 MG) and 26 Diesel Hydraulic (3BG and 23 MG) locomotives.

Pahartali and Dhaka Diesel Workshops undertake repairs of MG Diesel Locomotives while Parbatipur Diesel Workshop undertakes repairs of both BG and MG Diesel Locomotives. Heavy repairs and overhauls of diesel locomotives are done at Central Diesel Workshop, Parbatipur. The existing main line locos are all DE type manufactured by ALCO (USA) , MLW/ Bombardier Inc. (Canada) and Hitachi (Japan) for BG and General Motors (USA/Canada), MLW (Canada), Hitachi (Japan), ABB Herschel (Germany), DLW (India) and Hyundai(S. Korea) for MG.

Coaching Vehicles

At the end of the year 2013, BR had a total of 1,505-coaching vehicles out of which 1,472 are for conveyance of passengers and 33 are for conveyance of luggage, parcels, mails etc. as well as for departmental use.

Freight Wagons

At the end of the year 2013, BR had a total of 13,109 wagons comprising 7,625 covered and 5,484 special type wagons.

Containers

Bangladesh Railway has entered into a new era in transportation of freight traffic in containers from Chittagong to Dhaka. Special type Flat Wagons required for container movement were initially arranged by converting some existing wagons. Subsequently 80 bogie container flats were procured from China and another 100 bogie container flats

were procured from India. An Inland Container Depot has been opened at Dhaka with custom and port facilities for clearance of container traffic. Exclusive container train was introduced on 5th August, 1991. Since then, volume of container traffic gained momentum.

Mechanical Workshops

Bangladesh Railway has sheds, depots and workshops for maintenance of Rolling Stock, Locomotives are maintained in 3(Three) places viz shed, shop and CLW, Carriage and Wagons are maintained in two places i.e. in C & W Depot and workshop.

A. Locomotives are maintained in following workshops :

1. Central Locomotive Workshop at Parbatipur, Dinajpur (CLW)
2. Diesel Workshop at Pahartali, Chittagong.
3. Diesel Workshop, Dhaka.
4. Diesel Workshop at Parbatipur, Dinajpur.

B. Carriage and wagons are maintained in following workshops.

1. C and W Shop at Saidpur, Nilphamari.
2. C & W shop at Pahartali, Chittagong.

Railway Ferry Services

There were 28 marine vessels under Mechanical Department at the end of 2013. The fleet of the marine vessels consists of 2 Passenger vessels, 4 Tugs, 4 Wagon Ferry Barges, 5 Pontoon ramps, 4 Flats and 2 Berthing Pontoon and 7 other Crafts.

2.3.3 Routes Kilometers

Route Kilometers : 2,835.04

Track Kilometers : 3,973.49

2.3.4 Number of employees

As on date 30th June, 2013, there are 479 officers and 25,460 staff of different categories. The staff are graded/classified as class-III and class-IV staff. The ratio of officers and staff is about 1:88

2.3.5 Passenger and Freight Traffic

Passenger Traffic

Bangladesh Railway is the principal mode of transportation in the country. With the development of road transport facilities there has been a shift in the trend of passenger traffic with short distance passengers preferring road transport, because of their frequent and point to point services. During 2012-2013, about 65 million passengers were transported by Bangladesh Railway against about 46 million during 2011-2012. In order to render better services to the passengers, Bangladesh Railway introduced Intercity Train services in 1985. At present there are 75 Nos of Intercity Trains running. Around 36.8 of the total passengers of Bangladesh Railway are being carried by the "Intercity" trains which contribute approximately 75.2% of the total earning of passenger traffic.

Freight Traffic

The railway has been facing tough competition with other modes of transport for the high rated traffic, which pay more revenue. On the other hand, the railway is called upon to carry traditional low rated essentials. As a national carrier, BR has obligation to carry essential commodities like food grains, fertilizer, jute, cement, coal, iron and steel, stone and boulders, petroleum products, salt, sugar etc. to the remote corners of the country at a cheaper rate. The freight traffic during 2012-2013 was 3010 thousand Metric Tons against 3282 Thousand Metric Tons during 2011-2012. The financial statement of last 05 years and list of onging projects in Bangladesh Railway are shown in Table : 2.2 and 2.3 for understanding revenue , operating expenses, income etc.

Table: 2.1 Financial Statement

(Amount in Million Tk.)

	2008-09	2009-10	2010-11	2011-12	2012-13
Total operating revenue (Without considering PSO and Welfare grant)	6,253.53	5,663.04	6,295.46	6,034.29	8,042.63
Total operating revenue (Considering PSO and Welfare grant)	7,419.79	6,731.62	7,470.70	7,264.25	9,293.32
Total operating expenses	11,727.49	11,272.79	14,918.19	15,671.16	15,623.81

	2008-09	2009-10	2010-11	2011-12	2012-13
Net operating income (Without considering PSO and Welfare grant)	(-) 5,473.96	(-) 5,609.75	(-) 8,622.74	(-) 9,636.86	(-) 7,581.19
Net operating income (Considering PSO and Welfare grant)	(-) 4,309.71	(-) 4,541.17	(-) 7,447.49	(-) 8,406.91	(-) 6,330.49

Table: 2.3. List of on going projects

Sl No	Name Of The Projects
1	Procurement Of 47 (41 MG and 6 BG) D.E. Locomotive. (01.07.96 to 30.12.2011)
2	Conversion Of Dhaka-Joydebpur Mg Section Into Dual Gauge (2nd Revised) (01-07-1999 To 30-06-2010)
3	Construction Of A Railway Line From 4 Tarakandi To Jamuna Bridge (2nd Revised) (01-07-1999 To 30-6-2010)
4	Modernization Of Signaling and Interlocking 6 System Of 12 Stations At AKA-SYT Section (1st Revised) (01-07-2004 To 30-06-2010)
5	Construction Of Double Line Between Tongi and 8 Bhairab Bazar With Signaling System (01-07-2006 To 30-06-2011)
6	Reforms Of Bangladesh Railways 1-07-2006 To 30-06-2011)
7	Procurement Of 1 BG and Mg Mixed Under-Floor Wheel Lathe Machine (01-07-2006 To 30-06-2011)
8	Rehabilitation Of 65 (56 Mg and 9 BG) Locomotives) (Revised 45 Nos. - 36 Nos. Mg and 9 Nos. BG) Locomotives Of Bangladesh Railway (01-07-2006 To 30-06-2010)
9	Rehabilitation Of FOUZDARHAT-CGPY-SRV-CHITTAGONG Sections In East Zone Of Br (01-07-2007 To 30-06-2011)
10	Conversion Of Vacuum Brake System To Air Brake System Of 277 Mg BC Wagon Of Br (01-07-2007 To 30-06-2010)

Sl No	Name Of The Projects
11	Rehabilitation Of Rajshahi-Rohanpur Border and 15 Amnura-Chapainawabganj Sections Of Br (01-07-2007 To 30-06-2011)
12	Rehabilitation Of Lalmonirhat-Burimari Sections Of Br (01-07-2007 To 30-06 - 2011)
13	Rehabilitation Of Dhaka-Narayanganj Section Of Br (Qi-07-2007 To 30-06-2011)
14	Remodeling Of Khulna Railway Station and Yard And Development Of Operational Facilities Of Benapole Railway Station (01-07-2007 To 30-06-2011)
15	Emergency Flood Damage Rehabilitation Project/2007 (01-11-2007 To 31-12-2009)
16	Procurement Of 50 Nos. Mg Flat Wagon (BFCT) and 5 22 Nos. Mg Brake Van With Air Brake For Carrying Container (01-07-2007 To 30-06-2011)
17	Improvement Of Pahartali Workshop (01-07-2007 To 30-06-2010)
18	Procurement Of 11 Nos. Mg Locomotives) (01-07-2007 To 30-06-2012)
19	Consulting Engineering Services For Dhaka 26 Chittagong Development Project and Skill Development Program (01-07-2007 To 30-06-2013)
20	Track Doubling Between Laksam And Chinki Astana (01-07-2007 To 30-06-2013)
21	Chittagong Station Yard Remodeling (01-07-2007 To 30-06-2014)
22	Rehabilitation Of Gouripur-Jariajhangail And 29 Shamganj-Mohanganj Sections Of Br (01-07-2007 To 30-06-2012)
23	Balance Work Of Rehabilitation Of Main Line Section Of B.R. (East Zone) (01-01-2008 To 30-06-2009)
24	Construction Of Load Monitoring Device On Track In The Both Side Bangabandhu Bridge(01-31 01-2009 To 31-12-2010) Including Signaling And Interlocking System Of B. RLY. (1st Revised) (01-07-2004 To 30-06-09)
25	Modernization Of Saidpur Railway Workshop (01-07-2008 To 30-06-2012)

Sl No	Name Of The Projects
26	Conversion Of Parbatipur- Kanchan-Panchgarh and Kanchan -Birol Metre Gauge Section Into Duel Gauge Section and Birol -Birol Boarder Section (01-02-2009 To 31-01-20i2)-07-2008 To 30-06-2012)
27	Procurement Of 1 No. 60 Ton Capacity Mg and 1 No. » 80 Ton Capacity BG Cranes For Accident Relief Train (01-07-2008 To 30-06-2011)
28	Technical Assistance For Institutional Support Of Br (01-07-2007 To 30-06-2012)
29	Technical Assistance For Feasibility Study, Safeguard Policy Study, Detailed Engineering Design and Tendering Services For Project Under World Bank Funding For Bangladesh Rly. (01-07-2007 To 30-06-2010)
30	Technical Assistance For Project Preparation Towards Implementation Of Expert Infrastructure development Project Under World Bank (Wb) Financing (01-07-2008 To 31-03-2013)
31	Rehabilitation Of 200mg and 60 BG Passenger Coaches Of Bangladesh Railway (01-01-2009 To 31-12-2010)
32	Rehabilitation of Mymensingh-Jamalpur-Dewangong Bazar Section of Bangladesh Railway (01-03-2009 To 30-06-2012)
33	Construction of Dhaka-Mawa-Janjira-Bhanga BG rail line including feasibility study (2011-2015)
34	Rehabilitation of Dhaka-Narayangong Section (2011-2015).
35	Conversion of Metre Gauge track into DG on Parbatipur-Kanchan-Panchagar and Kanchan-Birol section and MG Track into BG on Birol station-Birol Border section of Bangladesh Railway (2011-2015).

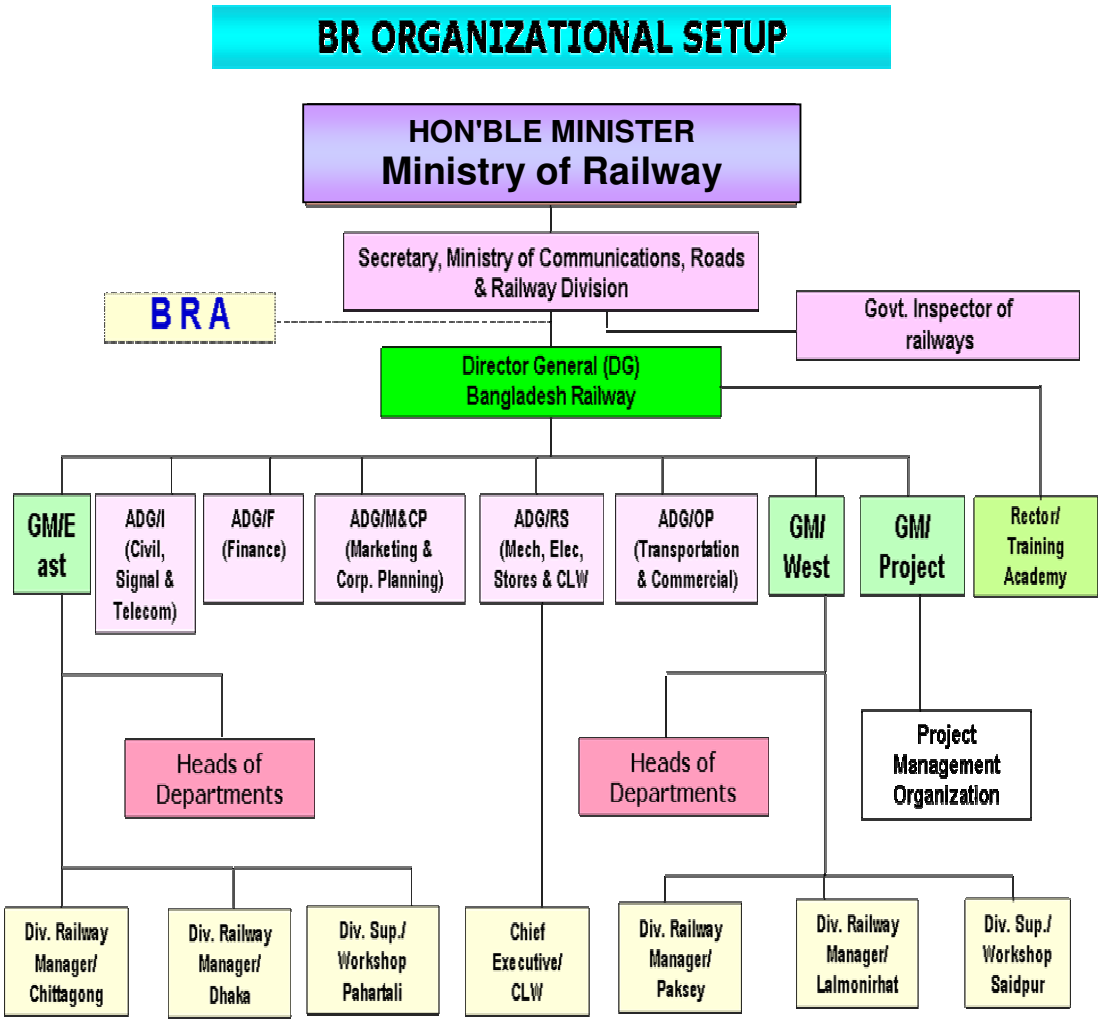

Figure: 2.1 Bangladesh Railway organizational setup

Figure: 2.2 Bangladesh Railway Route Map

CHAPTER THREE

CONCEPTUAL ASPECTS OF INVENTORY CONTROL SYSTEM (ICS)

CHEPTER-3

CONCEPTUAL ASPECTS OF INVENTORY MANAGEMENT SYSTEM (IMS)

3.1 DEFINITION OF INVENTORY

Inventory is the stock of any item or resource used in an organization. An inventory system is the set of policies and controls that monitor levels of inventory and determine what levels should be maintain, when stock should be replenished and how large orders should be placed.

By convention, manufacturing inventory generally refers to items that contribute to or become part of a firm's output. Manufacturing inventory is typically classified into raw materials, finished products, component parts, supplies and work-in-process. In services, inventory generally refers to the tangible good to be sold and the supplies necessary to administer the service.

The basic purpose of inventory analysis in manufacturing and stock keeping services is to specify when items should be ordered and how large the order should be. Many firms are tending to enter into longer-term relationships with vendors to supply their needs for perhaps the entire year.

3.2 PURPOSES OF INVENTORY:

All firms keep a supply of inventory for the following reasons:

1. **To maintain independence of operations:** Supply of materials at a work center allows that center flexibility in operations. For example because there are cost for making each new production setup, this inventory allows management to reduce the number of setup.

   Independence of workstations is desirable on assembly lines as well. The time that it takes to do identical operations will naturally vary from one unit to the next. Therefore, it is desirable to have a cushion of several parts within the workstation so

that shorter performance times can compensate for longer performance times. This way the average output can be fairly stable.

2. **To meet variation in product demand:** If the demand for the product is known precisely, it may be possible (though not necessarily economical) to produce the product to exactly meet the demand. Usually, however, demand is not completely known and a safety or buffer stock must be maintained to absorb variation.

3. **To allow flexibility in production scheduling:** A stock of inventory relieves the pressure on the production system to get the goods out. This causes longer lead times, which permit production planning for smoother flow and lower -cost operation through larger lot-size production. High setup costs, for example, favor producing a larger number of units once the setup has been made.

4. **To provide a safe guard for variation in raw material delivery time:** When material is ordered form a vendor delays can occur for a variety of reasons: a normal variation in shipping time, a shortage of material at the vendor's plant causing backlogs, an unexpected strike at the vendor's plant or at one of the shipping companies, a lost order or a shipment of incorrect or defective material.

5. **To take advantage of economic purchase order size:** There are costs to plan an order: labor, phone calls, typing and postage so on. Therefore, the larger each order is, the fewer the orders that need be written., Also, shipping costs favor larger orders the larger the shipment the lower the per unit cost.

   For each of the preceding reasons (especially for items 3, 4 and 5) be aware that inventory is costly and large amounts are generally undesirable, Long cycle times are caused by large amounts of inventory and are undesirable as well.

3.3 Inventory Costs:

In making any decision that affects inventory size, the following costs must be considered.

1. **Holding (or carrying) cost:** This broad category includes the costs for storage facilities, handling, insurance, pilferage, breakage, obsolescence, depreciation, taxes and the opportunity cost of capital. Obviously high holding costs tend to favor low inventory levels and frequent replenishment.

2. **Setup (or production change) costs:** To make each different product involves obtaining the necessary materials. Arranging specific equipment setups filling out he required paper. Appropriately charging time and materials and moving out the previous stock of material.

   If there were no costs or loss of time in changing from one product to another many small lots would be produced. This would reduce inventory levels with a resulting savings in cost. One challenge today is to try to reduce these setup costs to permit smaller lot sizes. (This is the goal of a JIT system.)

3. **Ordering Costs:** These costs refer to the managerial and clerical costs to prepare the purchase or production order. Ordering costs include all the details, such as counting items and calculating order quantities. The costs associated with maintaining the system needed to track orders are also included in ordering costs.

4. **Shortage costs:** When the stock of an item is depleted, as order for that item must either with until the stock is replenished or be canceled. There is a trade off between carrying stock to satisfy demand and the costs resulting from stock out. This balance is some times difficult to obtain, because it may not be possible to estimate lost profits, the effects of lost customers or lateness penalties. Frequently, the assumed shortage cost is little more than a guess, although it is usually possible to specify a range of such costs.

   Establishing the correct quantity to order from vendors or the size of lots submitted to the firm's productive facilities involves a search for the minimum total cost resulting from the combined effects of four individual costs, holding costs, setup costs, ordering costs and shortage costs. Of course, the timing of these orders is a critical factor the may impact inventory cost.

3.4 COMPONENT/ELEMENTS OF INVENTORY CONTROL SYSTEM:

An inventory is stock or store of goods. Inventory of small items are ranging from pencils, papers, clips, screws, nuts or bolts to large items machines, trucks, construction equipment airplanes.

Many of items a firm carries inventory relate to the kinds business it engages in. thus manufacturing firms carry supplies of raw material, purchased parts, partially finished items, finished goods as well as spare parts for machine. Departmental store carry inventory of clothing, furniture, carpeting, stationary, appliance, gifts and toys etc.

Hospital stock, drugs, surgical supplies, life monitoring equipments, sheets, pillowcases and more, super market stock canned foods, packaged frozen foods, house hold supplies, baked goods, dairy products, produce and other items.

A typical manufacturing firm carries different kinds of inventories:

- Raw materials and purchased parts.
- Partially completed goods called work in process (WIP).
- Finished goods inventories (manufacturing firms) or merchandise (retail store).
- Replacement parts, tools and supplies.
- Goods-in-transit to ware houses or customers (pipe line inventory)

3.5 BENEFITS OF INVENTORY:

1. To meet anticipated demand.
2. To smooth production requirement.
3. To decouple components of the production distribution systems.
4. To protect against stock out.
5. To take advantage of order cycles.
6. To hedge against price increases or to take advantage of quantity discounts.
7. To permit operations.

3.6 Trends in ICS Management

Just-in-time (JIT): JIT is a philosophy of management process that comprises of following issues:

1. Elimination of waste and disruption.
2. The involvement of everyone in the operation.
3. The drive for continuous improvement.
4. Making the system flexible by reducing set up time and lead time.

The wastes included in JIT philosophy are as follows:

- **Over production:** Producing more than that is immediately needed by the next process in the operation is the greatest source of waste according to Toyota.

- **Waiting time:** It consists of labor waiting time and machine waiting time which are measured by labor efficiency and machine efficiency.

- **Transport:** This waste occurs due to improper layout of networks between factory, go down and outlet.

- **Process:** Process waste occurs as a result of poor maintenance and poor design of components.

- **Inventory:** Under JIT philosophy, all inventories become a target for elimination. However, it is only by tackling the cause of inventory that it can be reduced.

- **Motion:** An operator may look busy but sometimes no value is being added. Thus wastage occurs due to motion.

- **Defective goods:** Producing defective goods is a major source of waste in operation process.

The principles of JIT for service providers:

The principles of JIT for service providers was introduced and developed by famous fast food chain, McDonald's. The concepts are mentioned below:

- **Consistently high quality:** Benchmarking, service design and quality function deployment can be used successfully in service operations. Service employees can be taught the value of providing defect free services.

- **Uniform facility loads:** Reservation system and differential pricing are two ways in which service providers can level the load on their facilities.

- **Standardized work methods:** In highly repetitive service operations, great efficiencies can be gained by analyzing work methods and standardizing improvement for all employees to use.

- **Close supplier ties:** Close suppliers contacts are necessary to ensure frequent, short lead times and high quality shipment of materials.

- **Flexible work force:** The more customized the service, the greater is the need for a multi skilled work-force.

- **Automation:** Automation can play a vital role in providing just in time services. For example, banks offer ATM service to provide 24 hour services to customer.

- **Preventive maintenance:** Machinery-dependent services (such as Disney world, Foy's Lake Entertainments etc.) need routine preventive maintenance to accommodate large volume of customers.

- **Pull methods of material flow:** Service operations where tangible items are processed, such as fast food shops can utilize the pull method (self service).

- **Link-flow strategy:** Employee and equipment should be organized in a sequential way to eliminate wasted employee time.

The goals of JIT in brief:

The ultimate goal of JIT philosophy is a balanced system that is one that achieves a smooth, rapid flow of materials through the system. The idea is to make the process time

as short as possible by using resources in the best possible way. The degree to which the overall goal is achieved depends on:

- **Eliminate disruption:** Disruption upset smooth flow of product through the systems; so it should be eliminated. Poor quality of equipment, equipment breakdown, change to schedule, late delivery etc. are major causes of disruption. All these should be eliminated as much as possible.

- **Eliminate waste:** Wastes represent unproductive resources, so these should be eliminated to enhance production.

- **Make the system flexible:** A flexible system is one that is robust enough to handle a mix of products and to handle changes in the output level while still maintaining balance. System can be made flexible by reducing setup time and lead time, as setup time and lead time impact negatively on flexibility.

Inventory connecting system:

- **Periodic system:** Physical count of items in inventory made of periodic intervals (weekly, monthly)
- **Perpetual inventory system:** System that keeps track of removals from inventory continuously. Thus monitoring current levels of each item.
- **Two Bin Systems:** Two containers of inventory, reorder when the first is empty.
- **Universal Product Code:**

  Bar code printed on a label that has information about the item to which it is attached. The Zero on the left of the bar code identifies this is a grocery item. The first five numbers (14800) indicate the manufacturer (Mott's) and the last five numbers (23208) indicate the specific item (natural style apple sauce). Item in small package such as candy and gum uses six digit numbers.

UPC scanner represents a major change in the inventory systems of stores that use them. In addition to their increase in speed and accuracy. These systems give manager continuous information on inventories, reduce the need for periodic inventories and order

size determinations and improve the level of customer service by indicating the price and quantity of each item on the customer's receipt.

Bar coding represents an important development for other business besides retailing. Manufacturing service industries also benefit from the simplified production and inventory control it provides. In manufacturing bar codes attached to parts, sub-assemblies and finished goods greatly facilitate counting, monitoring activities. Automatic routing, scheduling, storing and packing can also be done using bar code.

RFID (Radio Frequency Identification):

RFID is Relatively New Automatic Identification and Data Caption (AIDC) technology. This wireless AIDC system allows where non-contact reading and consequently are effective in manufacturing and other hostile environments where bar code labels could not survive. RFID is established itself a wide range of markets including live stock identification and Automated Vehicle Identification (AVI) systems because of its ability to track moving objects. The technology has become a primary player in automated data collection, identification and analysis system world wide.

RFID is non contact, non line of sight nature of the technology. Tags can be read through a variety of substances such as snow, fog, ice, paint, crusted grime and other visually and environmentally challenging conditions.

CHAPTER FOUR

PRACTICE OF INVENTORY CONTROL SYSTEM IN BANGLADESH RAILWAY

CHAPTER – 4

PRACTICE OF INVENTORY CONTROL SYSTEM IN BANGLADESH RAILWAY

4.1 Historical Background

In Bangladesh Railway, stores department perform the job of material management including inventory control and materials procurement. Inventory control and materials procurement is closely related. Stores department's history is similar as Bangladesh Railway. Railway established in this subcontinent in 1862 and from that stores department is operating for procuring and storing materials. At the initial stage this department's operation was limited but in course of time as Railway increase its operational activities, stores department's activity also increased. From the very beginning of establishing Railway communication system, different workshop was established for repair and maintenance of rolling stock and other equipment. At that time concept of material management was also developed in the then Railway management.

4.2 Objectives of stores / Inventory department

A sound and developed inventory management is one of the primary requirements for success of an organization. The basic objectives of efficient inventory control management are to hold a minimum level of inventory so as to saving of revenue of an organization. If the inventory level is high, the organization has to spend more and more for inventory purpose and as a result the cost of product or service increase. The main objective of the department is to maintain a minimum level of inventory so the organization can spend the savings money to other area and then the cost of the product or service come down.

The Other objective of inventory management is to preserve the materials in safe and supply them to the consumer as and when required supporting a failure free maintenance program. In Bangladesh Railway there need different types of spares for the system and most of them are to collect from abroad. So there is obvious for stocking some materials i.e. inventory is maintained. To achieve these objectives, policy makers encourage for inventory and that should be as minimum as possible. As the stores department responsible for supplying spares, raw materials and others materials, its objectives may be outlined in order as below:

- **Assess the requirement and indent for procurement to the procuring wing:** Based on previous consumption the stocking depot assesses the demand for the future period. As the consumption pattern is not steady, they depend on last 3 years average consumption. The policy makers decide lead-time for procurement and also select for safety stock. Based on the above information demand for future period (it may be for one year or more) are calculated and asked for procurement.

- **Procurement of materials as per requirement:** After receiving the demand for procurement, the procurement wing arrange for procurement. They first prepare tender schedule and then tender is floated. After receiving offer from the bidder the committee select the appropriate bidder based on the available information and come to an agreement to supply the same. Then the supplier or BR opens L.C. for the materials. With in due date the principal shipped the materials.

- **Clearance of the materials from port and send to the stocking depot:** One of the important function of the stores i.e. inventory control department is clearing functions. After receiving the materials to the port, it is the duty of that department to pay custom duty and other duty to the custom and port authority and clear the materials from port. After clearance the authority send those materials to the ultimate consignee. The department also some time acts the clearing function of other government organizations.

- **Inspection of materials those are supplied on free Pahartali basis:** Some materials are asked for Free Pahartali basis i.e. materials are supplied, to the purchaser's premises within the offer price. Those materials are tested and inspected to the inspecting office located at Pahartali. After receipt the materials the authorized personnel inspect the materials and if it is found ok then those are send to stocking depot and send advice to the concern department for payment.

- **Stocking the materials and issue to the consumer as their requirement:** The stocking depot receives the materials from shipping and inspection department. They check and count those as per voucher. After that they account for them and posting in the ledger card. Here materials also preserve in the specific bin. Consumer place requisition for different materials that the depot officer issues the same to the consumer and raise debit against their accounts.

- **Preservation and maintenance of materials:** Beyond issue and receipt of materials there is severe work regarding stocking of materials. Materials and spares are stocked for long period of time and that is why materials and spares may damage and become useless. To prevent damage and save national property, concern management is to be serious regarding preservation and maintenance of spares and materials.

These are the traditional objectives of Store Department i.e. inventory department of Bangladesh Railway. The department has also promotional and controlling objectives in order to ensure the smooth supply of materials, avoid surplus, Procurement with minimum price and maintained quality. The department has to observe for a minimum level of inventory. Such objectives are:

- **To ensure Materials quality:** For the rolling stock, safety is the primary condition and for that quality materials are needed in Bangladesh Railway. To maintain quality, the government established a quality control unit under inventory management i.e. stores department. This department's main objectives are to ensure the quality for the materials, which are supplied free Pahartali basis. For the importing materials to maintain quality, management engaged different international inspecting agency whose are liable for quality control.

- **To ensure minimum price of the materials:** Bangladesh Railway is a public property and its operational expense is maintained by government revenue. So everybody related to its procurement system should be careful about its price. Procuring entity should be careful about price during procurement of

materials. By procuring with minimum price management can save public property. For this purpose there are several tools to control.

- **Make available the materials in right time:** Main purpose of establishing store department is to stock material and supplies them to the consumer as per their need. Regular maintenance of different rolling stock, Railway path and other equipment necessary for train communication is essential for failure free train communication. If store department fail to supply materials in time, maintenance program will be held up, the labor remains idle and there is a huge loss of the organization. So it is very much essential to make available materials in time.

- **Supply to the consumer as and when they ask:** One of the objectives of stores department is to supply the materials to the consumer with out any delay. Any delay can hamper the outturn of the schedule product. Workshop and other department's maintenance program depend on the spares which are stocked in the store department. For that timely supply of the spares are obligatory.

- **Careful about stocked materials:** All the materials those are stocked are not used in shorter period. Some materials are rare use but those are not readily available both in local and foreign market. So such kind of capital items are procured and stocked for long time to face an emergency any unavoidable situation. But if those are not put in care the lifetime of those materials will reduce and may become useless within the box.

- **Careful about wear and tear and also theft:** Stocking depot management is to be careful about wear and tear and also theft for the materials. Because one of the above can cause revenue loss of the state. For long time not issue the materials may become useless due to wear and tear, so the management have to be careful about the use of the materials.

- **Careful about being surplus:** If the inventory management is not serious and careful about the inventory assessment, huge materials may be stocked which

in course of time may become surplus. Surplus of the materials causes revenue loss and decline the efficiency of the management. It blocks the revenue and one of vital yardstick of efficiency measuring tools.

- **Prevention of under stock or out of stock:** Management should have to be also careful so that important item may not become out of stock. If the production hamper for want of the goods, then the labor remain idle and huge loss of revenue occur. Inventory is maintained for uninterrupted production and this may hamper if some spares become out of stock.

4.3 Functions of Inventory Control department

Functions of inventory control department are closely included in the objectives of the department. In Bangladesh Railway's Stores department acts as the supporting department of the other departments and is responsible for supplying the materials in time. On the other hand we can say, the stores department furnishes backend support of the maintenance department. The production unit is fully depends on the inventory department. So the efficiency of the production unit depends on the performance of the inventory department. There are several functions of the inventory department. This may be categorized as

- **General function,**
- **Controlling function and**
- **Promotional function.**

The functions of the inventory department are discussed elaborately below.

4.3.1. General Functions

There are several functions under general category. This category function included all types of functions those are performed always. Under general functions the major responsibilities are:

- **Stocking materials:** The main function of the inventory control department is to stock materials. But behind stocking material there are so many works happening. Keeping the materials in safe and dispose as per requirement is the main function of the inventory management. For better efficiency of this

department it should always maintain a minimum level of inventory without hampering production.

- **Demand for materials:** Before stocking materials we it needs to assess how many materials are to be stocked. The concerning department assess materials need based on lead-time and also on safety stock. Here pervious consumption rate influence vitally to assess the need for materials. In Bangladesh Railway based on previous average monthly consumption assessment for need of raw materials and spares are determined.

- **Purchase materials:** If demand for materials placed but not arrangement for procurement, then how materials to be collected? To meet this demand, purchasing wing arrange for procuring the materials. The main objective of purchasing wing is to procure right materials, at the right time with right price. The objective is set in such way, so that quality materials can be procured with minimum price quickly.

- **Clearance the imported materials:** In Bangladesh Railway most of the materials are procured from abroad. For importing materials some arrangement need for clear them from the port. To avoid extra hazard, the department introduces a separate wing, which only responsible for clear materials from port and send them to the ultimate consignee.

- **Inspecting the Free/Pahartali supplied materials:** For the materials which are received on free Pahartali basis i.e. supplier reach the materials to the procuring authority, are need for inspecting them for quality control. Inspecting wing works for inspecting the materials. This wing is responsible for quality control of those materials. It also responsible for sending the materials to the ultimate consignee.

- **Sending the materials to the ultimate consignee:** After receiving materials from port and for the free Pahartali basis supplied materials, after inspecting them, it need for sending them to the ultimate consignee, i.e. to the stocking depot these functions are carried out by the shipping and inspecting wing.

The major wings that carry out these functions are described later in section 4.3.4

4.3.2 Controlling Activities

With the name of inventory control the controlling activity are silently included. To maintain required levels of inventory its need some controlling activity. The department carries out the following controlling activities.

- **Inventory Control:**

  Excess stock of materials causes blockade of revenue, which ultimately creates a barrier for making profit of an organization. Inventory wing is responsible for need assessment of the stocked items. At time of placing demand this wing should be careful about present stock of those materials, previous consumption rate of that materials as well maintenance program of different workshop. This wing can help management by controlling inventory. A minimum level of inventory one side reduce need for extra revenue, on the other hand there is less possible of being surplus of those materials. In Bangladesh Railway's inventory control wing was established keeping in mind about this situation. But practically the wing is not capable of working independently and there is also gap of information and traditional system of record keeping.

- **Quality control:**

  This area is also very important in consideration of inventory control. Quality control activities ensure better quality of material, which ensure longer life of the finished product. Quality control wing can plays vital role for inventory control. If qualities of materials are its required level, the expected life of the finished goods is maintained and demands for materials remain at its expected level. Thus the quality control wing controls inventory.

- **Price control:**

  If the price of procured spares and raw material is minimum, then the total inventory value remains minimum. The procuring wing can do price control and it is one of the vital sectors of inventory management. During procurement, related personnel should keep in mind that it is public property and we should careful about it. Procuring materials for the industry with minimum price help the management for planning more profit.

- **Time control:**

  One of the crucial duties of Inventory management is to supply materials to the consumer. In time supply of materials support workshop's maintenance program positively. If supply delayed, the maintenance program hampered, labor remain idle, cause a huge loss of the organization. Inventory control department can control the supply time and this is a duty of this department.

- **Budget control:**

  Major portion of the budget of an organization goes to maintain the inventory. So by controlling inventory, an organization can control its budget. For uninterrupted maintenance program we can procure a lot of material and stock those years together. But this is not the efficiency of the inventory control unit. Rather they should be careful about the budget of the company and the related sector.

- **Consumption Control:**

  The inventory control department can also control the consumption of the user department. From the previous record the inventory control department can assess the actual need and thus can identify the access demand.

4.3.3 Promotional Activities

- **Searching for new supplier:** Inventory department's objectives are making available of the raw materials and spares at right time at right price. For this purpose it need reliable supplier. This department has to search for new supplier always. This search procedure is a continuous process and this process help to collect materials at a competitive price.

- **Searching for New producer or source:** Some materials are produce by different producer and the inventory department has to find such producer. If information of all producers \ is available, then inventory management can achieve materials at competitive price. This searching procedure is a promotional activity of the inventory department.

- **Searching for diversified use of materials:** Some raw materials are used in different activities. Inventory department has to find such materials, so that, in

absence of the one, the other can serve the purpose.

- **Searching for Local producer for the foreign materials:** For procuring materials from abroad railway needs huge foreign currency. Government encourages the local producers those who are capable of manufacturing some materials which are imported earlier. It is inventory management's duties to search and find such type of manufacturer.

4.3.4 Inventory control Department of Bangladesh Railway

Inventory control department of Bangladesh Railway comprises several wings and section. The available wing and section are described below:

- **Stocking Depot:** in Bangladesh Railway, Stocking depot only responsible for stocking materials and place demand for the future use. There are 7 stocking depot under Inventory control department. These depot stock materials and issue them to the consumer as per their requirement. The depots are situated at Chittagong (Three), Dhaka (One), Parbatipur (Two) and Saidpur (one). Out of seven, two depot stock all store other than locomotive spares. Four depot stock only locomotive spares and the rest one stock only permanent way materials. There is at least one workshop near by each depot, otherwise we can say, near by every workshop there is at least one stocking depot.

- **Purchasing Wing:** This wing's main function is to procure materials as per demand placed by the stocking depot and also directly by the consumer. In every situation the purchaser should have careful about high rate and over stock and procure in shorter time.

- **Shipping Wing:** This wing's main function is to clear materials that are collected free on board basis. This wing clear material from port after paying different duty and then check the materials as per voucher. It also responsible for sending the materials to the destination.

- **Inspecting Wing:** Mainly acts as the quality control unit for the materials that are collected on free Pahartali basis. This wing plays vital role for maintaining the quality of the required materials.

- **Inventory control Wing:** This wing plays important role for controlling inventory. They control the demand and also control the consumption. This department adjusts the surplus materials with other depot's need. Especially for diesel spares the, return from this department can not be expressed in some ward.

- **General Section:** This section though are not directly involved in inventory control activity, yet it is one of the part of the inventory control and play role by maintaining personnel information of the department and procuring materials for special project.

4.3.5 Organizational Structure of Bangladesh Railways Inventory Department:

The organizational structure of Bangladesh Railway has two different phases. One of them consists of the top management, the members of which are involved in the policy making part of the organization. The Organ gram of Bangladesh Railway is shown below:

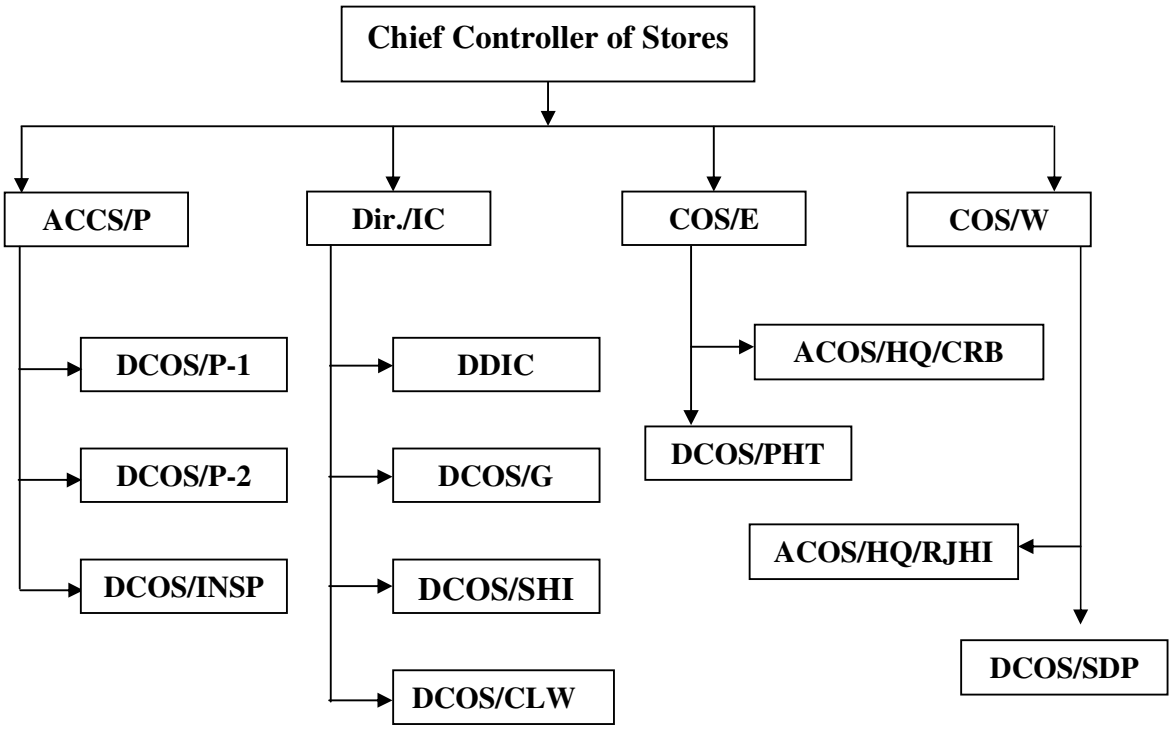

Figure: 4.1 Organizational Structure of Inventory Department

4.4 Present Inventory situation of Bangladesh Railway

4.4.1 Present Inventory situation:

From various annual/monthly reports and computerized inventory reports are studied and inventory value of the organization is shown table: 4.1 and 4.2. The report formulated as on 31-12-2013

Table 4.1 Inventory of different diesel depot

(In Million Taka)

Year	CLW	PBT	DA	PHT	Total
31-12-04	779.20	398.17	190.91	266.58	1634.86
31-12-05	786.14	404.36	204.29	303.87	1698.66
31-12-06	772.81	891.87	206.29	282.61	2153.58
31-12-07	829.23	893.61	223.20	296.97	2243.01
31-12-08	853.47	860.18	214.77	300.91	2229.33
31-12-09	1023.87	884.65	227.81	285.95	2422.28
31-12-10	1029.65	848.00	235.68	289.97	2403.30
31-12-11	1155.20	896.93	242.56	284.91	2579.60
31-12-12	1239.85	928.27	247.84	299.31	2715.27
31-12-13	1279.55	965.90	239.30	287.31	2772.06

Table 4.2 Inventory of different General Depot

(In Million Taka)

Year	Pahartali	Saidpur	KNNR	Total
31-12-04	431.47	177.89	221.00	830.36
31-12-05	469.40	190.75	167.68	827.83
31-12-06	422.69	222.37	274.33	919.39
31-12-07	394.31	212.00	261.81	868.12
31-12-08	420.62	211.09	278.17	909.88
31-12-09	390.70	275.60	282.91	949.21
31-12-10	367.17	368.07	273.01	1008.25
31-12-11	344.91	382.88	247.24	975.03
31-12-12	383.91	374.61	272.49	1031.01
31-12-13	360.72	402.19	278.80	1041.71

From the above data regarding value of the inventory of Bangladesh Railway, it is clear that there is a huge block of revenue for maintaining the inventory. Approximately

materials of 3814 millions taka are stocked at the end of year 2013. Where as it is found that annual consumption of materials from inventory department is approximately 954 million taka. Besides, it is also observed that the value of inventory is always increasing. An efficient organization always tries to keep its inventory to a satisfactory level. But in case of Bangladesh Railway, it is observed that instead of decreasing inventory is increasing. It is not a good symptom.

Issue and Receipt particulars of different depot (last 10 Years):

Against above information regarding inventory value, issue and receipt particular of materials of different depot is given in table: 4.3 and table: 4.4.

Table 4.3 Issue and receipt particulars of Diesel depots

(Amount in million taka)

Year	CLW		PBT		PHT		DA		Total	
	Receipt	Issue	Receipt	Issue	Receipt	Issue	Receipt	Issue	Receipt	Issue
2004	421.29	46.82	65.68	34.31	32.57	49.14	60.83	6.12	580.37	136.39
2005	71.74	64.80	34.06	27.87	111.79	74.50	45.71	32.33	263.3	199.5
2006	60.43	73.76	822.00	334.49	34.16	55.42	27.50	25.50	944.09	489.17
2007	105.45	49.03	31.77	30.03	82.23	67.87	54.76	37.85	274.21	184.78
2008	141.29	117.05	19.52	52.95	56.11	52.17	21.55	29.98	238.47	252.15
2009	285.20	114.80	61.52	37.05	59.18	74.14	38.06	25.02	443.96	251.01
2010	103.90	98.12	25.51	62.16	62.72	58.70	40.20	32.33	232.33	251.31
2011	312.22	186.67	98.22	49.29	75.05	80.11	32.78	25.90	518.27	341.97
2012	189.70	105.05	88.72	57.38	80.20	65.80	41.33	36.05	399.95	264.28
2013	160.22	120.52	76.12	38.49	58.12	70.12	35.71	44.25	330.17	273.38

Table 4.4 Issue and receipt particulars

(Amount Million taka)

Year	Pahartali		Saidpur		KNNR		Total	
	Receipt	Issue	Receipt	Issue	Receipt	Issue	Receipt	Issue
2004	218.35	154.36	165.55	154.36	118.77	115.88	502.67	424.6
2005	201.92	163.99	166.04	153.18	107.21	160.53	475.17	477.7
2006	129.31	176.02	226.32	194.70	119.40	12.75	475.03	383.47
2007	153.63	182.01	240.72	251.09	88.17	100.69	482.52	533.79
2008	215.18	188.87	267.08	267.99	47.01	30.65	529.27	487.51
2009	160.78	190.70	404.01	339.50.	72.93	68.19	637.72	598.39

Year	Pahartali		Saidpur		KNNR		Total	
	Receipt	Issue	Receipt	Issue	Receipt	Issue	Receipt	Issue
2010	188.70	212.23	302.70	210.23	99.52	109.42	590.92	531.88
2011	140.92	163.18	280.12	265.31	67.35	93.12	488.39	521.61
2012	211.32	172.32	261.93	270.20	102.18	76.93	575.43	519.45
2013	192.70	215.89	222.70	195.12	92.25	86.04	507.65	497.05

Table 4.3 and 4.4 shows the yearly receipt and issue position of different depot. Table 4.3 and Table 4.4 indicate that almost in every year receipt value is higher than the issue value.

From the above report, it is clear that the inventory department possess spares of price almost Tk. 3372 million. It is also clear that every year value of inventories is increasing. If this situation continues, loss of the organization will increase. Materials are procuring on the basis of average consumption, but due to inconsistencies of consumption all the materials are not consumed and some are accumulated. At the time of visiting different depot and asking to the employee, it is found that some spares are stocked almost 25 years back and those were not used. It means those requirements were not made properly.

From table 4.1 it is clear that, only for diesel depot, in last 10 year, there were addition to the inventory amounting Tk. 1452 million. The information is surprising and main tools for proving the inefficiency of inventory control. But in the case of general depot it is seen a little bit better condition. Over last 10 years, there is a little amount is added to the inventory.

4.4.2 Present Stocking (Inventory) System.

Practically Bangladesh Railway follows the traditional approach of stocking and maintaining the materials. Several times I visited the stocking depot.. There are 7 (seven) different stocking depot in the organization of Bangladesh Railway. Materials are kept here and some materials are kept in open field. There is no location tag with the packet or box of the materials. There is no location code system for stocking and searching materials quickly. As a result the management depends on the stockholder for any kind of information regarding materials and any kind of discrepancies. The detail stocking system of different depots are described below-

4.4.3 General Depot at Pahartali, Saidpur and KNNR

In Pahartali Depot, there stocked spares and raw materials for the carriage and wagon, Electrical Installation, Telecommunication Equipment and Installation, Permanent way materials, water supply and building repair instrument and raw materials. These materials are very much essential for maintenance of the carriage and wagon, which is the backbone of the train communication. There are different wards for stocking the materials. The Detail of stocking ward and stocking materials is described in table: 4.5 and table: 4.6.

Table 4.5 Depot's detail ward structure and class content (Pahartali)

Ward	Class	No of items	Description of class
A	GB8	114	Furniture, Crockery, cutlery, Napery and house Furnishings.
B	GB9	11	Cloth, Clothing and Personal equipment.
	C	119	Workshop Machinery, Plant and equipment including Pneumatic machinery and tools.
	GB2	41	Lamp and lamps fittings.
	D2	11	Permanent way materials and track tools
	GA	293	Small Tools and hand tools excluding machines. Materials of all of the above class are now regular transaction items
C	GB1	406	Hardware copper Tin and Zinc materials, that is, all simple material in common use manufactured from raw materials.
	GB3	92	Leather, canvas and Rubber in bulk and articles made from them which are not included in other heads
D	GB4	282	Metals

Ward	Class	No of items	Description of class
	EB4	60	Gas plants and lighting and their parts Hardware copper Tin and Zinc materials, that is, all simple material in common use manufactured from raw materials.
E (SIGNAL WARD)	F2	60	Signaling and interlocking material and their parts and fittings.
	HB4	493	Signaling Materials
	HE	85	Signaling Materials
F	GB5	73	Painting Materials
	GB7	02	Fuel and fuel oil for oil fired engine and boiler
	GB10	64	Miscellaneous store comprising oil and grease
H	HD	212	Electrical equipment, Cables and insulating materials
	Hb1	- -	Train and locomotives lighting plant and material including dynamos, switch gear etc.
	HB2(TL)	91	Electrical equipment for train lighting
	HB3	02	Electrical Equipment
	HA1	0	Electrical Plant
	HB2(AC)	461	Electrical equipment for air condition
	HA2	618	Electrical equipment
	HC	34	Distribution and transmission line materials.
	HA3	119	Electrical equipment
I	EB1	204	Railway Carriage and wagon under frames and components including brake rigging but excluding electrical materials and train lighting materials.
	EVB	97	Automatic vacuum brake equipment and its parts and fittings other than rigging and parts exclusively used on locomotive.

Ward	Class	No of items	Description of class
	EB5	02	Carriage and wagon fittings
	EB6	09	Carriage and wagon fittings
C & W	EC1	01	Carriage and wagon fittings
	EB2	103	Railway Carriage and wagon body components and components excluding electrical, gas, rubber and textile fittings.
J	GB10	143	Consumable goods
	GB6		Timber
	F1	125	Building Materials and pipe fittings
K	Gb11	87	Stationary goods and forms
L	Gb11	710	Traffic form and money value book
M	GB11	421	Miscellaneous forms only
Sale	S	294	All kinds of scrap materials
Booking Ward	- -	- -	This ward is not a stocking ward. This ward act as a transit ward. After issuing materials the concern custodian send the materials to the booking ward for dispatching the same towards the ultimate consumer. In Railway some consumer are far away from the stocking depot. Booking ward's function is to reach the materials to the consumer.
Receipt Ward	- -	- -	This ward is also not a stocking ward. This ward performs the task of receiving materials. This depot receives materials from the sender especially inspection and shipping department. They receive materials as per voucher and hand over to the concern-stocking depot for stocking.

Table 4.6 Depot's detail ward structure and class contents (Saidpur)

Ward	Class	No of items	Description of class
A	B1	114	Engineering Plant and component including all hands power machinery
	B2	185	Engineering Plant and component including all hands power machinery
	EA1		Steam locomotive and their parts and fittings including brake gear and excluding electrical materials
B1	EB (Mg)		Railway Carriage and wagon under frames and components including brake rigging but excluding electrical materials and train lighting materials.
	EB2 (Jap)		Railway Carriage and wagon body components and components excluding electrical, gas, rubber and textile fittings
	EVB (Jap)		Automatic vacuum brake equipment and its parts and fittings other than rigging and parts exclusively used on locomotive.
	EB5 (Jap)	72	Rubber fitting for EB1 other than those under EVB
B2	EB1 (WD)		Railway Carriage and wagon under frames and components including brake rigging but excluding electrical materials and train lighting materials.
	EB2 (WD)		Railway Carriage and wagon body components and components excluding electrical, gas, rubber and textile fittings
	EVB	224	Automatic vacuum brake equipment and its parts and fittings other than rigging and parts exclusively used on locomotive.
	EB5	72	Rubber fitting for EB1 other than those under EVB

Ward	Class	No of items	Description of class
	EB6	21	Trimmings and roofing, flooring and sewing materials.
C1	GB4	705	Metals.
C2	GB4	705	Gas plants and lighting and their parts Hardware copper Tin and Zinc materials, that is, all simple material in common use manufactured from raw materials
D	GB1	258	Hardware copper Tin and Zinc materials, that is, all simple material in common use manufactured from raw materials
E	HA2	231	Generator, Switch gear, Transformer, converters, motors i.e. Electrical equipment.
	HA3	22	Generator, Switch gear, Transformer, converters, motors i.e. Electrical equipment '
	HB2		Electrical equipment for train lighting
	HB4	39	Signaling Materials
	HE	106	Signaling Materials
	HD	228	Signaling Materials
	HC	27	Distribution and transmission line materials for use on overhead lines for electrical distribution as apart form materials and equipment for telegraphs and telephone.
	EC1	2	Rail Motors and their parts and fittings
	EC2	2	Rail Motors and their parts and fittings
F	GB6	74	Timber
	GB10	220	Miscellaneous store comprising oil and grease
H	C	777	Workshop Machinery, Plant and equipment including Pneumatic machinery and tools.
	D2	31	Permanent way materials and track tools

Ward	Class	No of items	Description of class
	GA	1655	Small Tools and hand tools excluding machines Materials of all of the above class are now regular transaction items. ;
I	F1	245	Building materials, water mains sewage system and truck and yard enclosing materials, and all other parts and fittings
	F2	51	Signaling and interlocking material and their parts and fittings
	GB2	87	Covers Lamp and lamps fittings
	GB3	145	Leather, canvas and Rubber in bulk and articles made from them which are not included in other heads
	GB8	73	Furniture, Crockery, cutlery, Napery and house Furnishings.
	GB9	37	Cloth, Clothing and Personal equipment
J	GB10	220	Miscellaneous store comprising oil and grease
	GB5	103	Painter Stores
	EB4	56	Gas Plant and its parts and fittings and accessories
	GB7	2	Fuel and fuel oil
Booking Ward			This ward is not a stocking ward. This ward act as a transit ward. After issuing materials the concern custodian send the materials to the booking ward for dispatching the same towards the ultimate consumer. In Railway some consumer are far, away from the stocking depot. Booking ward's function is to reach the materials to the consumer.
Receipt Ward			This ward is also not a stocking ward. This ward performs the task of receiving materials. This depot receives materials from the sender especially inspection and shipping department. They receive materials as per voucher and hand over to the concern-stocking depot for stocking.

Earlier, in Pahartali depot GB-9 class i.e. uniform, raw materials of uniform, GB-8 i.e. cookery and cutlery and C -class i.e. sewing machine spares parts were stocked. But after abolishing the sewing machine plants the materials of the above three class are not stocked at present rather custody stock materials are now stocked in this ward. But in Saidpur depot still some materials of the above class (GB8 and GB9) are stocked.

From the above classification of class and ward, it is very much clear that comparing to the no of item of each class, it is not logical of maintaining this huge no of class. The management can reschedule the existing class and as well as stocking depot. In some ward there is no transaction in a working day, it means that the works load is quite low. On the contrary, there are some wards, where there is a big transaction in a day. So it is very much essential to redistribute the works load through out the wards and also close some unimportant ward to reduce maintenance cost.

Stocking system of individual items of all three depots is not satisfactory level. Some materials are kept in open field and in unorganized way. A systematic stocking system can help to quick operation and identification of items. This also increases the efficiency of the inventory management.

4.4.4 Diesel Depot at Dhaka, Parbatipur, CLW and Pahartali

Although for all diesel depot, the stocking materials shown in table: 4.7, table: 4.8, table: 4.9 and table: 4.10 are common, yet there is no similarity for stocking materials. Some spares are stocked all four depots, some other stocked in two or more depot. As all general Overhaul (GOH) is performed in CLW, so all the materials are stocked in CLW depot. Diesel spares stocking system is little bit better comparing with other store.

Table 4.7 Detail Dhaka depot's stocking system

Ward	Class	No of items	Description of class
A	05	113	Engine governor
	10	600	Spare parts for engine and under gear equipment
	33	560	Spare for MED (Meter Electric DLW-India) locomotives

Ward	Class	No of items	Description of class
	40	8	Cables and wire
B	09	346	Air brake item for all locomotive
	29	869	Electrical spares for locomotive
	72	263	Tools for locomotive maintenance
C	05(partial)	113	Engine governor
	09(partial)	346	Air brake spares and equipment
	10(partial)	188	Spares for engine and under gear equipment.
	17	502	Spares parts for Hitachi engine
	29(partial)	867	Electrical spares for locomotive

Table 4.8 Detail Parbatipur depot's stocking system

Ward	Class	No of items	Description of class
A	04	4	Wheel For Locomotives.
	10	1108	Spare parts for engine and under gear equipment.
	29	442	Electrical spares for locomotive.
	33	760	Spares for BED (Broad gauge Electric DLW-India) locomotives
	40	3	Cables and wire
B	05	67	Engine Governor for all locomotive
	09	359	Spares for air brake and its equipment
	16	25	Spares for General Motor's Locomotives
	17	479	Spares for Hitachi Locomotives
	19	15	Spares For English Electric Locomotives
	72	55	Tools And Machinery
	76	10	
C	11	2568	Spares for Hungarian Locomotives

Table-4.9 Detail CLW depot's stocking system

Ward	Class	No of items	Description of class
A	10	5079	Spare parts for engine and under gear equipment
	40	73	Cables and wire
B	04	6	Wheel For Locomotives
	05	1804	Engine Governor for all locomotive
	09	2269	Spares for air brake and its equipment
	16	6103	Spares for General Motor's Locomotives
	72	120	Tools And Machinery
C	17	2026	Spares for Hitachi Locomotives
	29	3027	Spares for Electric Component for all locomotives
D			Receipt and Custody Stock

Table-4.10 Detail Pahartali depot's stocking system

Ward	Class	No of items	Description of class
A	16 (partial)	1912	Spare parts for engine and under gear equipment
	09	416	Spares for air brake and its equipment
B	04	7	Wheel For Locomotives
	09	1	Brake Block Only
	10	2	Spares for engine and under gear equipment
	16 (Partial)	949	Spares for General Motor's Locomotives
	19	1646	Spares for English Electric Locomotives
C	05	79	Engine Governor for all locomotive
	16 (Partial)	501	Spares for General Motor's Locomotives
	29	3	Spares for Electric Component for all locomotives

Ward	Class	No of items	Description of class
	40	36	Cables and wire for all locomotives
	72	214	Tools and Plants
	76	9	

Dhaka Depot has 3 wards for stocking materials. One SAE is in charge of every ward. There are 4775 stock items in this depot. Practically it is found that 10 percent of the stocked items are out of stock and 20 percent of the stocked items have regular demand from the consumer.

Parbatipur Depot has 3 wards for stocking materials. One SAE is in charge of every ward. There is 5895 stock item in this depot. Practically it is found that 10 percent of the stocked items are out of stock. And 20 percent of the stocked items have regular demand from the consumer. It is observed that 2568 items of 11class are totally surplus since last 20 years and there is no activity to reduce or alternate of these items and it is about 12 percent of the total inventory. To become surplus of these huge materials mean that inventory department is not efficient.

At the time of visiting this depot it is observed that condition of stocking depot is not healthy and the stocking system also not good. The present condition of different stocking ward may cause damage of huge materials.

CLW Depot has 4 wards for stocking materials. One SAE is in charge of every ward. There are 20507 stock items in this depot. Practically it is found that 40 percent of the stocked items are out of stock. And 25 percent of the stocked items have regular demand from the consumer. The conditions of stocking wards of this depot are little bit better than other depot. The depot is constructed recently and it followed latest stocking system.

PHT Depot has 3 wards for stocking materials. One SAE is in charge of every ward. There are 5775 stock items in this depot. Practically it is found that 15 percent of the stocked items are out of stock. And 25 percent of the stocked items have regular demand from the consumer. The conditions of stocking wards of this depot are little bit better than

Dhaka and Parbatipur depot. The depot is re-constructed recently and it followed latest stocking system. It is observed that 1646 items of 19class are totally surplus since last 20 years and there is no activity to reduce or alternate use of these items and it is about 5 percent of the total inventory. To become surplus of these huge materials mean that inventory department is not efficient.

From the above Table 4.7 to 4.10 it is observed that some items of same class are stocked in different ward. Due to stocked in different ward, it is very difficult to monitor the stock position of the materials. The location of ward "C" of Dhaka Depot is away from the original depot. It also the demerits of proper maintain of inventory.

For CLW huge no of materials, almost 80 percent of the total stocked items are stocked here. But a remarkable no of items are out of stocked. For this depot kit list system assessment are followed and for that after finished of a program all the materials stock finished. Although the inventory of this depot is high, the concern people said in near future the inventory level would reduce and become to a reasonable situation.

At the time of visiting this depot it is observed that condition of stocking depot is not healthy and the stocking system also not good. The present condition of different stocking ward may cause damage of huge materials.

4.5 Stock replenishment system of Bangladesh Railway

Inventory department of Bangladesh Railway is responsible for collecting material and supplies them to the different consumer as and when they required. The concerning depots are responsible for stocking and supplying materials to the ultimate consumer. The depot management is also responsible for stock replenishment for the goods. For this purpose they have to assess the requirement of the same. In every organization use previous consumption rate for assessing future demand. In Bangladesh Railway, the inventory management also uses previous consumption rate to determine the need. Besides, need assessment also made on the basis of pre declared material list and maintenance program for specific period of time. This system is only used for general overhaul of locomotives and repair and return system at central Locomotive Workshop at Parbatipur, Dinajpur. Railway introduced this idea recently, Perhaps this concept hired from developed country, during a CIDA aided maintenance project. Detail replenishment systems are described below for each of the system.

4.5.1 Need assessment system for both general Depots

In general depot there are several types of materials and also several types of consumer. Their consumption pattern also varies over time period. Actual program and demand do not support maintenance program. As a result their demands vary every time. For the first time, for stocking the materials it uses the estimated annual consumption rate, supplied by the consumer at the time for requesting to stock the materials. After issuing for a sufficient period of time the authority uses the average consumption rate.

Earlier (before the year 2001) they use the system ACST (Annual Contract Statement) for assessing the demand for a period of one year. In a certain time of a year, they used to calculate to find the demand for one-year period of time. Here they used average consumption rate and the lead-time, also considered the existing present stock and previous demand those are not covered with supping materials. In the Stores department two types of materials are stocked,

1) Foreign materials locally or directly collected from source,

2) Some locally produced (BSCIC) items those are collected locally based on rate/frame work contract for a specific period. The formula used to calculate the demand quantity are described as below-

1) Assessment Formula for foreign materials:

REOPT = Minimum Stock + Safety Stock + Lead Time

= AMC × (Minimum Stock factor + Safety factor + Lead Time factor)

Here, Minimum Stock Factor = 6 month

Safety Factor = 6 month

Lead Time = 9 month

Therefore,

REOPT = AMC × (6+6+9)

= 21 × AMC

Now, Re-Order Quantity (ROQ):

ROQ = REOPT + Economical Procurable Quantity-(P.S. + Dues) + P.D. (If any)

Here, Management decide for economical quantity as 6 month

P.S. = Present Stock

Dues = Demand for procurement that are waiting for procurement and receiving materials.

P.D. = Pending Demand, that could not supply against the demand of the Consumer.

ROQ = 21 × AMC + 6 × AMC-(P.S. + Dues) + P.D.(if any)
= 27 × AMC - (P.S. + Dues) + P.D. (if any)

There fore,

ROQ = 27 × AMC - (P.S. + Dues) + P.D. (if any)

2) Assessment Formula for BSCIC materials:

BSCIC Items means those items, which are manufactured by the local small and cottage industries. As these items are produced locally, so all the factor is lower than that of foreign materials.

REOPT = Minimum Stock + Safety Stock + Lead Time
= AMC × (Minimum Stock factor + Safety factor + Lead Time factor)

Here, Minimum Stock factor= 3 month
Safety Factor = 2 month
Lead Time = 3 month for eastern part of the Railway
Lead Time = 4 month for western part of the Railway

Therefore,

REOPT = AMC × (3+2+3)
= 8 × AMC for East Zone
=9 × AMC for West Zone

Now, Re-Order Quantity(ROQ):

ROQ = REOPT + Economical Procurable Quantity-(P.S. + Dues)+P.D. (If any)

Here, Management decide for economical quantity as 4 month

P.S. = Present Stock

Dues = Demand for procurement that are waiting for procurement and receiving materials.

P.D. = Pending Demand, that could not supply against the demand of the consumer.

ROQ = 8(9) × AMC + 4 × AMC - (P.S. + Dues) + P.D. (if any)

There fore,

ROQ = 12 × AMC - (P.S. + Dues) + P.D. (if any)- For East Zone
= 13 × AMC - (P.S. + Dues) + P.D. (if any)- For west Zone

Here it is observed that it considered minimum stock and also safety stock. For considering both the minimum stock and safety stock the stock always increase and increase. For smooth operation of the system either safety-stock or minimum stock consideration can minimize the stock.

4.5.2 Need assessment system for all Diesel (Locomotive Spares) Depot

Locomotive spares are special in nature comparing to other types of vehicle. Spares of locomotive are not manufactured in our country even it is not available in the local market and the manufacturer manufacture the items as they receive order from the buyer. Most of the spares are collected from abroad. Producer starts production after receiving order from Bangladesh Railway. So keeping in mind this view, BR management set a long lead-time for collecting locomotive spares. There are four workshops for locomotive maintenance in Bangladesh Railway. Out of these four one is exclusively for general overhaul of the locomotives and the other three for performing minor schedule. So consumption pattern differ for each workshop. The need assessment for different workshop is described below.

4.5.2.1 Assessment system for three diesel depot

Consumption patterns for three-diesel depots adjacent to three workshops where only minor schedules are performed are similar in nature. So the stocking system and 'demand generation system for the entire three diesel depot. In the adjacent workshop, it performs similar type of job through out the year and for this average consumption is almost similar over period of time. Practically it is found that consumption rate of spares of these three depot are almost similar and based on this average consumption rate future need assessment are made. Based on this ideology the management set formula for calculating future demand. As all the materials are foreign and it need average 12 month for receiving

materials from abroad after placing order. So calculating demand it use lead-time of 9 month. The formula used here is as below-

In the Stores department two types of materials are stocked-

1) Foreign materials locally or directly collected from source
2) Some locally produced (BSCIC) items those are collected locally based on rate contract for a specific period.

1) Assessment Formula for foreign materials:

REOPT = Minimum Stock + Safety Stock + Lead Time

= AMC × (Minimum Stock factor + Safety factor + Lead Time factor)

Here,
Minimum Stock factor = 6 month

Safety Factor = 6 month

Lead Time = 9 month

There fore,

REOPT = AMC × (6+6+9)

= 21 × AMC

Now, Re-Order Quantity (ROQ):

ROQ = REOPT + Economical Procurable Quantity-(P.S. + Dues) + P.D. (If any)

Here, Management decide for economical quantity as 6 month

P.S. = Present Stock

Dues = Demand for procurement that are waiting for procurement and receiving materials.

P.D. = Pending Demand, that could not supply against the demand of the consumer.

ROQ = 21 × AMC + 6 × AMC-(P.S. + Dues) + P.D. (if any)

= 27 × AMC - (P.S. + Dues) + P.D.(if any)

Therefore,

ROQ = 27 × AMC - (P.S. + Dues) + P.D. (if any)

2) Assessment Formula for BSCIC materials:

BSCIC items mean those items, which are manufactured by the local small and cottage industries. As these items is produced locally. So all the factor is lower than that of foreign materials.

REOPT = Minimum Stock + Safety Stock + Lead Time

= AMC × (Minimum Stock factor + Safety factor + Lead Time factor)

Here,

Minimum Stock factor = 3 month

Safety Factor = 2 month

Lead Time = 3 month for eastern part of the Railway

Lead Time = 4 month for western part of the Railway

Therefore,

REOPT = AMC × (3+2+3)

= 8 × AMC for East Zone

= 9 × AMC for west zone

Now, Re-Order Quantity (ROQ):

ROQ = REOPT + Economical Procurable Quantity - (P.S. + Dues) + P.D. (If any)

Here, Management decide for economical quantity as 6 month

P.S. = Present Stock

Dues = Demand for procurement that are waiting for procurement and receiving materials.

P.D. = Pending Demand, that could not supply against the demand of the consumer.

ROQ = 8(9) × AMC + 4 × AMC - (P.S .+ Dues)+ P.D.(lf any)

= 12 × AMC-(P.S.+ Dues)+P.D.(if any)

There fore

ROQ = 12 × AMC-(P.S .+ Dues)+ P.D.(if any) For East Zone

= 13 × AMC-(P.S .+ Dues)+ P.D.(if arty) For west Zone

Here it is observed that it considered minimum stock and also safety stock. For considering both the minimum stock and safety stock the stock always increase and increase. Here for both zones lead-time is calculated differently, as the safety stock and minimum stock is considered low compared to foreign materials. Here it is observed that it considered minimum stock and also safety stock.

4.5.2.2 Assessment for CLW depot

Central Locomotive Workshop performs special type of work for maintenance of locomotive. It performs only general overhaul of locomotive and this work includes full dismantling of locomotive. GOH (General Overhaul) of each locomotive perform after 6 (six) year, and there about 15 types of locomotive in BR and for each type of locomotive required different types of spares. As a result maintenance program of each type of locomotive comes after six year and for that each year consumption patterns differ from other. The spares needed this year would be needed after six year when same type of GOH will be performed. For the above reason based on average consumption forecasting of future demand will not be realistic and if procurement is made based on this demand, materials will not be used in near future or will not meet the demand in near future.

To over come the problem of overstock recently Bangladesh Railway introduce procurement system on the kit list basis against annual maintenance program. The kit list of component or locomotive repair program is prepared earlier and that is send to the inventory department and maintenance program of the locomotive is prepared earlier (almost 2 years ago) and send to the inventory department. Based on this maintenance program and kit list, the inventory department prepare the approximately requirement of spares for the desired maintenance program. For assessing the spares of CLW follows the following formula:

Assessment Qty = (Qty + Un sch. Qty) × (No of Component per loco) × (No of Loco)-(Free qty in CLW + Surplus Qty in other location)

For CLW depot the computerized inventory system is followed. Here for every program, spares are stocked On Hold condition for that specific program. Due to this On Hold system there is no possibility to use the materials in other program. This system lead some materials remain free which may be available for next program. This system leads the management to procure materials as per need basis only.

4.5.3 Reconciliation of demand at inventory control office:

In Bangladesh Railway inventory control office acts as head quarter of the diesel depot. The office creates demand for CLW depot on program basis. The office get the GOH program earlier and it have the kit list for GOH for every type of locomotive and on basis of above program and kit list ICC generate demand for CLW depot and intimate to the CLW depot. For other three depots it receive the demand for all depot.; It re-assess the demand and also consider the present stock for all depot. It also consider the surplus or not used item and if there is demand for those items to other depot, the office will adjust the demand by transferring the materials to the demanded depot. The main function of inventory control office is to reduce the inventory level to a satisfactory level. It performs the function by using its tools. For diesel i spares computerized inventory control system is introduced and with this program the authority can observe the present stock of any depot and consumption pattern of that depot. This position helps to take any decision for transferring materials from one depot to other depot. It also helps to generate demand on the basis of program and kit list. The demand generation work is done in a very short period of time and at that time it also consider present stock and consumption pattern.

4.6 Procurement System of the inventory:

Diesel Locomotive spares and also some other spares needed in BR are special in nature and the spares are not readily available in local and foreign markets. As the spares are special in nature and market demand are limited, the manufacturer do not manufacture the spares and put them on the shelf for purchaser, rather they produce spares after receiving order from the purchaser. On the other hand there is no specification of the spares, it has only part no which is the specification for the manufacturer. The manufacturer does not disclose its specification for other manufacturer, rather they set a part no for every spares and that part no is the specification of that spares. So by open tender the purchasers do not get any benefit and it need much time to finalize a tender. To reduce lead-time the authority decided to select the potential supplier or vendor who manufacture spares or collect from the manufacturer and supply to the purchaser. Later on, the procurement department float limited tender with in selected bidders.

To procure materials and stock for consumer for future consumption is the main activity of the inventory department. So delay in procurement cause loss of efficiency of the

inventory department. Beside maintain optimal level of inventory, it is very much essential to be efficient in procurement system. Procurement of the right materials in right time with right price is the key objectives of the procuring department. At the time of procuring materials, the purchaser should keep in mind about quality and timely supply of the same.

The Different Steps for Procurement of materials are described below

4.6.1 Receive the demand from the depot

Purchase wing receives the demand from the depot through inventory control office. This demand is the procurement demand for the purchase wing. The wing then starts for procurement activity. They prepare schedule for tendering purpose based on demanded materials. Demand for procuring materials is the beginning of procuring activity. This wing can not do its job with out receiving any demand from the consumer or the stocking depot.

4.6.2 Asking for bidder offer

In this stage the procurement wing float tender for appropriate supplier. There are several system for tendering. There are open tender i.e. unlimited supplier can attend the tender, Restricted tender i.e. only pre-selected suppliers are allowed to attend the tender and single tender i.e. only one who is the only producer of that goods. For locomotive spares restricted/limited tendering method is followed. This is because only some limited supplier or manufacturer can supply those. This restricted tendering method can help to reduce lead-time

4.6.3 Evaluation of the bidders offers

Evaluation of the bidders offer is the main and vital activity of the procurement system. Several bidders attend the tender system and they offer different quality materials and difference price of them. The tender evaluation procedure is to select the proper bidders who offer proper quality materials with minimum price. Weak tender evaluation procedure may cause procurement of faulty materials and cause huge losses of revenue. In this stage the authority evaluate both of technical and financial offer. The personnel who are involve in tender evaluating process should be careful and keep in mind that the money involve in procurement is the money of his own. Expends of money will be like of

his personal. The main them of government procurement are the three 'R's i.e. Procure right materials at right time with right money.

4.6.4 Letter of intention

After evaluation of the tender the appropriate bidder is identified and then issues a letter of intent inviting him to sign an agreement towards supply the materials. After receiving letter of intent the successful bidder prepare him to sign an agreement after depositing a Bank guarantee. It is not the guarantee for supplying materials.

4.6.5 Agreement

It is the procedure of signing a paper cited that the supplier are bound to supply the said materials in due time with the cited price and to support the agreement the supplier also submit a Bank guarantee. The agreements bring the supplier in bound form and there is no way to be escaped from this agreement.

4.6.6 Receive materials

After signing the agreement, the supplier makes arrangement to supply the same to the consignee. Supply of materials depends on contract agreement. For some materials, there are contract for supply the same on free shipment basis, while some other free Pahartali basis. Some materials are procured on free delivery to the ultimate consumer basis. There are generally two consignees for the inventory management. The function and activities are detailed up below.

4.6.6.1 Materials receive in inspection

For the materials which are contracted on free Pahartali basis, those are received in inspection wing. Here the materials are inspected and if those are found suitable then send those to the concern-stocking depot. Free Pahartali means, the supplier will supply materials to the purchaser is nominated place. This wing also liable for receiving quality materials. After certifying the receipt of quality materials, the finance department arranges for payment against supplier demand.

4.6.6.2 Materials receive in shipping

Materials those are received Free on board basis i.e. the principals are liable up to shipment. When this materials come to the port then this wing's responsibility are to clear

the materials from the port either from CTG. Port or any other sea or air port of the country. After clearing the materials from the port they bring the materials to their premises and count and compare them to the packing lists that were supplied with the original document. After receiving the materials as per list, the shipping wing dispatch the same to the ultimate consignee through rail transport or road transport. The function of the shipping department is very important, because delay in clearing materials causes a heavy demurrage, which increase the price of the materials and effect on manufacturing activity.

Some contract agreement of supplying materials free on board basis. This means, the supplier is liable up to shipment the same. The major portion of cost of materials is paid after shipment the same.

4.7 Transportation system of the inventory

In Bangladesh Railway inventory department stock materials at 7 (seven) different warehouse at different place of the country. As a result shifting of materials to different stocking place and send new materials to the stocking depot are a regular work of this department. This movement of materials need transport and in Bangladesh Railway both road and rail transport are used. But practically observed that a rail wagon loaded with railway materials need more time to reach its destination. Where as road transport need relatively less time to reach its destination.

4.7.1 Road Transportation system

In inventory control wing there is no road transport of its own. So to use this type of transport they need to hire the transport from other department specially from BRTC. Sometime they hire truck from private organization. They need road transport when it brings materials from port to the shipping depot and to send emergency materials to the ultimate consignee.

4.7.2 Rail Transportation system

Traditionally BR used rail transport system of its own use. Inventory department use rail transport system to transfer materials to different depot and sometimes to the ultimate consignee. This transportation do not need direct revenue of the department. It is very much secure for the materials and do not need extra care.

CHAPTER FIVE

PROBLEMS OF INVENTORY CONTROL SYSTEM (ICS) IN BANGLADESH RAILWAY

CHAPTER – 5

PROBLEMS OF INVENTORY CONTROL SYSTEM (ICS) IN BANGLADESH RAILWAY

5.1 Inefficiency regarding inventory control

Inventory is the foundation of an organization, especially for a manufacturing organization. Although Railway is a service providing organization, its service related equipment needs regular maintenance, which acts as a manufacturing unit. The manufacturing industry needs continuous support by the raw materials and spares parts. For maintaining inventory it needs some capital which have some opportunity cost. This capital could be used some other else which could bring profit for the organization. But in case of no inventory i.e. zero inventory, the industry need continuous supply of the raw materials as and when required. In Bangladesh Railway most of the spares needed are not readily available in the local market and also in the foreign market. Some spares are special types, which the manufacturer manufactures it after receipt order from the buyer. In this case zero inventory do not support the manufacturing activity. If the manufacturer unit suspended its production due to shortage of the spares, it loss a huge revenue for idleness of the labor and depreciation of the plant and loss due to short supply of finished product. The management of any organization should allow for inventory up to the same amount when its opportunity cost equals to the loss of the manufacturing due shortage of spares and there after the loss due to short supply of finished product. Efficiency in inventory control will be attained when a manager effectively maintains minimum level of inventory without hampering any production activity. A manager can stock a huge volume of inventory, which may ensure uninterrupted production process, but it is not economical i.e. efficient.

Bangladesh Railway is a governmental organization and for that the management are not careful about its improvement. To support different workshop and its maintenance program inventory department is very much essential. Practically the inventory is not controlled efficiently. From different report it is found that total consumption of spares of last 10 years is about 6600 Million, where as total procurement of materials are 8274 Million (See Table 4.3 and 4.4), as a result in last 10 years accumulation an inventory like 1674 million i.e. 167.4 million per year. For years together, accumulation now reached a

dreadful situation amounting Tk.3372 million. Instead of reduction of inventory, it is increasing day by day. It indicates inefficiency of the inventory control.

5.2 Inefficiency in stocking system

One of the best features of inventory control is its stocking system. Stocking system influence maintains of desired level of inventory. In Bangladesh Railway it is observed that present stocking system is not proper and scientific. There is huge space to stock materials but this space is not used properly and in modern way. At the time of visiting the respected stocking depot it is found several area where materials are not stocked properly. The condition of the general depots is very serious and compare to this depot, condition of diesel depots is little bit improved. It is found that recently the diesel stores are reorganized with a foreign aided project i.e. CIDA. During this project in the area of diesel spare there were a little bit trying to improve the situation.

Inefficiency in stocking system can not bring the desired success. Improper stocking consumes time both for stocking and issue to the consumer. For locating materials quickly, it needs proper and systematic stocking of materials. In absence of the above, some materials may be left behind as unused for long period of time. On the other hand one materials can be mixed with other materials which cause a very serious situation. Now a day's modern organization introduced latest stocking system. They use materials stocking location and use section, rack, and bin to stock the materials. Location system can help the custodian to search materials very quickly. Now a day, a small medicine shop also uses latest concept of stocking materials. Where as a government organization, like Bangladesh Railway, do not use the latest concept of stocking materials.

5.2.1 Inefficiency in general Depot regarding materials stocking

At present the activity of general depot are limited, but earlier it's function was wider. The stocking ward, area and the no of items that stocked were large. But in course of time no of items reduced and as a result all activity related to this items reduced. Earlier the stocking depot reaches the materials to the consumer and for that there were several activity. Although the workload of the general depot reduced, but the quality of work not improved. At the time of visiting the depot it is observed that there is a limited no of rack and bin in the ward of these depots. Moreover these rack are not used properly. Materials are not in the rack; rather they put the materials in the floor. They put light materials in

between heavy materials. The custodian needs more time to find out required materials and also stocking the same. It is earlier described (Table-4.5 to 4.10) the details ward and class of materials.

From the above table it is observed that for a small no of items (almost 6789 items for Saidpur depot and 5000 items for Pahartali Depot) there is huge use of manpower and also space. There are 14 stocking ward in Saidpur depot and 16 stocking ward in Pahartali. Each ward situated on space about 5000 sq. feet area and there is about 10 people in a ward including custodian, labor and clerk. This high investment for maintaining manpower and space is one of the main causes of inefficiency of inventory control. By using modern technology and system BR can maintain this portion of inventory easily with less manpower and wealth. This overhead cost increases the overall value of inventory.

Both the general depot at Pahartali and Saidpur, there is lack of modern system of stocking materials. Different manual regarding inventory department, there is advice for using location code to detect the materials in very short time. But the depot officers are not careful about system. There is also lack of unique identification number for the same materials stocked in different depot. As a result, the same materials are available in other place but due to absent of proper identification system, those materials remain unused for long period and at last it become surplus. Manual system of record keeping regarding materials issue and receipt is another lack of proper inventory maintenance system.

It is observed that there is a significant no of spares which is surplus due to non issue since long. Materials become surplus when there is no demand for the same for last 5 consecutive years. 10 % of the stocked materials are surplus both Pahartali and Saidpur depot. Earlier materials would procure through ACST system. In this system materials would procure for 12 month's consumption equivalent Qty 21 months before materials used. With in this long period of time, need for that materials may be changed and as a result this spares may become useless. On the other hand, due to obsolescence of technology spares that procured earlier may not be used. There is another reason, due to budget constraint consumer can not use all the materials actually they need.

5.2.2 Inefficiency in diesel Depot

In the diesel depot only locomotive spares are stocked and the stocking conditions are little bit improved. Recently Bangladesh Railway implemented a project for improvement the inventory system of the diesel spares. This project work improved the stocking of diesel spares but it is not up to the mark. In the diesel depot stocking area is not so large, but this small area is organized in some improved condition. There are sections, rack and bin for stocking the materials. Although there are some improved conditions in the diesel depot, yet the efficiency is not satisfactory.

Besides this, there is another problem, which is the overstock of the inventory. Beyond annual consumption, every year a huge quantity of material is stocked. This overstock is happening due to lack of technical knowledge of the technical personnel. They can not forecast what actually need and for this huge materials are to be stocked. There is also another area for what inventory increase to an alarming situation. There are several types of locomotives in Bangladesh Railway, and for each type of locomotive it needs thousand types of spares for maintenance program. At the end of life-times the locomotives become obsolete and the spares that were stocked earlier also become surplus. The consumer can not forecast about actual life times or the turning point when it will become inoperative and for that materials procurement can not be controlled and these huge spares become surplus. In every depot there is a Central Ledger Section (CLS), which maintain the numerical ledger card for the spares. This section is apart from the stocking depot and the control of this section is on separate supervisor, so that manipulation can not be made. The main activity of this section is to keep record on ledger card about materials issue and receipt, demand place and procurement. Beyond record the expected record, this section can also help to control the inventory. The CLS section can inform the management about the stock position and the consumption pattern of crucial items. But practically this section of every stocking depot is very much weak. The sections don't perform its duty properly. If this section did its duty properly, the inventory level would not be at this serious level.

5.3 Inefficiency in assessment system

Assessment for procurement of materials plays an important role to control the inventory. The requirement depends on the nature of materials and availability of materials. Bangladesh Railway uses both local and foreign materials and for that it uses different

formula for assessing procurement of materials. The top management set formula for assessing the requirement of the department. The inventory department always keeps keen attention on the alternative situation of Bangladesh Railway and the whole world. The inventory time to change the formula as the situation demand. Since establishment of the department, it has changed the lead-time several times. As change of lead-time there is an impact of total demand. There is another factor for assessing the demand. The idle situation is that there is always a steady demand and all the instruments work properly altogether. But practically, all the variables do not work properly. Here demand of the consumers does not remain steady, People do not work properly and the suppliers do not respond honestly and properly. Due to inefficiency of the department, sometimes stock of the materials become nil and for that assessment for demand do not meet the actual demand. As most of the materials come from abroad, so if one of the instruments don't work properly, then the system fails. Here there are several steps to receive materials after placing demand and for that proper lead-time can help to maintain a desired level of inventory. High lead-time may cause of over stock of materials where as low lead-time may result out of stock of materials. So setting of lead-time influence a lot for inventory maintain.

All the depot primarily assess the need on the basis of actual previous consumption and then sent to the controlling office for further verification and adjustment of the surplus materials of the other depot. The head quarter of inventory office, after receiving the demand of different depot, analyze the demand, present stock of self depot and the present stock of other depot and then finalize the demand and send to the procurement wing. The primary assessment and then checking in the head quarter plays a vital role for maintain inventory. If, during assessment surplus item of another depot do not considered then material become surplus and inventory level goes high. On the contrary, if during assessment out of stock period do not considered, flexibility also not considered, then materials become short comprising to demand.

At the time of consultation with the employee of different depot it is found that there is another cause for assessment problem. The concern personnel are not care about placing demand. There is reorder level at which demand for purchase is placed. The reorder level is always changing. After every issue, the reorder level is changed and based on that reorder-level the depot personnel place demand. Some cases it is found, demand is placed

when stock position goes far lower to the reorder point. As a result spare goes out of stock and create imbalance situation. Bangladesh Railway's inventory control department procures materials as per consumption. But the materials received almost 18 months after demand placed based on present consumption. Then the consumption rates do not remain same as 18 months before. At that time demand may increase or decrease. Moreover consumption rate do not remain similar as per idle condition and demand also vary considering to the actual need.

5.3.1 Assessment problem for general Depot

In every general depot there is a central ledger sections which maintain the materials transaction records. There is a reorder level for reordering materials for every item. This reorder level is determined based on previous consumption. At the time of issuing materials, concern card ledger poster keep very much attention for reorder level. Whenever the present stock comes to its reorder level, it initiates demand and takes in to knowledge of the higher officials. If the higher officials satisfied with the demand prepared by the concern section, the officer then pass towards the controlling head quarter for further assessment. For assessment they use formula which described earlier.

From the formula the inventory department calculates the need, it is observed that they uses

Safety factor = 6 months equivalent consumption
Minimum Stock = 6 months equivalent consumption
Lead Time = 9 months equivalent consumption

Here lead-time 9 months is used to arrange procurement after receiving demand and receiving materials from abroad after placing demand. For procurement procedure it takes minimum 3 months time and on the other hand for receiving materials from abroad or local supplier it need minimum 6 month. In this consideration lead-time 9 months is acceptable. But practically with in 9 months no materials receive to the consignee.

There is a safety factor equal to 6 months consumption that may need for any types of failure or emergency. There may be delay of receiving materials for any unavoidable situation and for that case safety stock may support the system to continue. Besides safety stock Railway's Inventory department uses minimum stock equivalent to 6 months

consumption. Both the safety stock and minimum stock uses to face the same situation. It seems that total factor of both safety and minimum is more than actually need. To overcome any type of unavoidable situation management can set 9 months equivalent consumption instead of 12 months consumption. If it uses 9 months equivalent consumption as safety stock or minimum stock then inventory level will come down to a satisfactory level.

For BSCIC items it is observed that they use

Safety factor = 2 months equivalent consumption
Minimum Stock = 3 months equivalent consumption
Lead Time = 4 months equivalent consumption

As the BSCIC items produce locally and it does not take enough time for getting the materials. So in this case use of both safety factor and minimum stock as five months lead the stock to be overstock. Here lead-time 4 months is enough to procure the materials and also support the emergency situation. So for improvement management can set both safety factor and minimum stock as minimum stock and the factor value can be set as 4. Then stock will be reduces one-month equivalent consumption and this will help to reduce inventory value.

5.3.2 Assessment problem for Diesel spares

Although there are four diesel depot in Bangladesh Railway, but there are two system for assessing the requirement of the depots. For three depot, the consumption pattern are similar, where as for the other depot, the assessment system is quite different. There is one workshop adjacent to every depot. For three workshop-Dhaka, Pahartali and Parbatipur, consumption patterns are similar and it performs only light schedule and the nature of schedule are almost same. So these three depots uses same formula for collecting materials. The formula that use to assess the demand are as below-

Reorder Qty = (Maximum + Minimum + Lead time)×Average monthly consumption-Present stock -Dues

Detail of the formula is described in previous chapter. For the diesel spares all the spares come from abroad and for that some safety stock is to be maintained. From the formula it is observed that

Safety factor = 6 months equivalent consumption
Minimum Stock = 6 months equivalent consumption
Lead Time = 9 months equivalent consumption

Here lead-time 9 months is used to arrange procurement after receiving demand and receiving materials from abroad after placing demand. For procurement procedure it takes minimum 3 months time and on the other hand for receiving materials from abroad or local supplier it need minimum 6 month. In this consideration lead-time 9 months is acceptable. But practically with in 9 months no materials receive to the consignee.

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5.3.3 Assessment for CLW Depot

Consumption pattern of the CLW depot is not similar to those of the other depot. Adjacent workshop only performs the General Overhaul activities of the locomotives, which comes after six years once it is performed. There are several types of locomotives and for six years same types of locomotives are not overhauled. Rather this year perform one type of locomotive that comes for GOH program after six year. This year consumption is not similar to the consumption of the next year. This is because for different types of locomotives it needs different types of spares. So the assessment systems for other depot do not meet the requirement of the CLW's demand. For that here another method for assessing the need is used. The workshop authority earlier informed the list of spares those will be needed for maintenance program of every type of locomotives. On the other hand, eighteen months before the maintenance program start, workshop informs about the program to the indenting department for procuring materials. Based on the kit list described above and maintenance program, Inventory control wing assesses the need for spares. At the time of assessing the spares, it also consider the existing stock and pipeline materials of the same. At the time of visiting the concerning area, it is found that, kit list is prepared based on experience and fix approximate need i.e. probability of need for the spares. But it is observed that this fixation of spare need is not proper and as a result some spares are not used and for want of some other maintenance work are hampered. The assessing formula can be stated as below-

Requirement = (Required Qty + Unscheduled Qty) × Qty Per Loco × Loco Qty

Required Qty = Required qty (Full Qty) of spares for every component

Unscheduled Qty = Probability for requirement of spares (Required only fraction)

Qty per Loco = No of component required for every locomotive

Loco Qty = No of loco that to be repaired or included in the program list.

The system here used is more appropriate than the other i.e. Re-Order system. Most of the modern manufacturing industries uses this system of procurement. The marketing department forecast about requirement of the specific period of time and based on that

requirement raw material, labor force and required machinery are arranged earlier. But in Bangladesh Railway, Lack of proper knowledge, they are not capable of preparing efficient kit-list and for that requirement of materials are not assessed properly.

5.4 Inefficiency in procurement system

There is lead-time for procuring materials for store department. But materials are not procured in the lead-time period. It is observed, from sending demand to receiving materials it takes almost 18 months on an average. Where as lead-time is only 9 month. This happens due to inefficiency of the procurement department. Like other government organizations, Bangladesh Railway possesses some traditional and inefficient system. Due to this procurement system, BR can not procure materials in time.

Lacking of supervision, negligence of work, lack of control and lack of responsibility lead the procurement activity to a delayed process. Inefficiency in every step of procurement activities is described below-

- **Preparation of tender schedule:** After receiving the demand from the stocking depot, the procuring wing prepares the tender schedule for the bidder. It consists of the specification of the materials, compulsory requirement of the bidder and the financials requirements for attending the tender. Traditional manual system is adopted for preparation of tender schedule. It takes long time to prepare a tender schedule. Time consumption in this stage leads the management towards inefficiency.

- **Floatation of tender:** After preparing of the tender schedule, the procuring authority float tender on paper or to the pre-qualified bidders or single source where ever it is applicable. Traditional paper publication system is adopts which causes losses of time both for tender publishes. Internet floating system can save both money and time.

- **Submission of Offer:** After a certain period of time (earlier cited in the tender schedule) of opening tender, the interested bidder submit their offer financial and also technical if applicable. The bidder submits their offer manually to the purchaser. Instead the provision for Internet submission can help management for any type of forgery or fare of muscleman.

- **Opening of the offer:** After the due time, the proper authority, open the offer that was submitted in presence of the bidder if present. The tender opening committee scrutiny the offer and note down the shortcomings of the requirements. The existing systems of opening tender loss time and manpower that is one of the causes of inefficiency.

- **Evaluation of the tender and acceptance:** Evaluation of tender is the main and vital step of procurement. A committee evaluates the tender for the appropriate bidder and submits for acceptance of the higher authority. The authority then accepts the proposal and then asks the successful bidder for compliance the offer. In Bangladesh Railway it is observed that this work take several months which is the main cause of inefficiency of the inventory department.

- **Notification of award:** After selection of proper bidder, a letter of intent is issued to the successive bidder to sign an agreement with the purchaser for supplying the materials. But here the supplier delays to sign the agreement, as a result delay occurs for placing letter of credit and purchase order.

- **Opening Letter of credit:** After signing the agreement, the supplier deposits a bank guarantee as security money supplying the same. But it is observed, almost for every case, supplier delayed depositing the bank guarantee and thus delayed in placing letter of credit. But the authority does not take any action for such delay and thus efficiency falls for procuring materials.

- **Extend time of delivery:** For failure of supplying materials in time, the supplier seeks for extending time of delivery and the authority almost every case, with out any penalty extend time for delivery of materials. This cause delay in supply and increase lead-time.

From the above discussion, it is clear that every stage of procurement activities it occurs delay, in every corner of activity, everybody delay unnecessary. But there is no responsibility for this delay and for that inventory system suffer. Practically observed, from preparation of tender document to place letter of credit or signing contract, in every

stage, people who are engaged in work are not interested with this work and as a result there occur a huge delay.

5.5 Inefficiency of shipping and inspection system

In the case of clearing materials from the port the shipping department do not perform their job efficiently. After receiving the shipment document this department does not response quickly to clear the materials from the port. As a result in most cases they have paid extra delay charge which directly imposes on the price of the materials. This delay happened due to the internal system of Bangladesh Railway and also the lack of seriousness of the respective department. Inspection wing plays a vital role for maintaining quality control of the materials received through this department. Although the responsibility vested on them is high, yet there is no modern equipment to test the materials. There is one traditional testing laboratory near by the inspection wing with too old equipment, do not met the requirement of the department. With out modern equipment inspection wing can not test materials properly. Some time they send to BUET and other organization for testing the same. This system of testing materials from outside organization requires more time and cause delay in receive materials from the suppliers. Without improvement of the testing facility, quality of the materials can not be improved and out put of the inspecting wing will not be up to the mark.

5.6 Inefficiency in inventory transportation system

In Bangladesh Railway transportation of inventory plays a vital role for a effective inventory system. To meet the emergency need of different consumer, the inventory management always transfers materials from one stocking depot to another depot. Where as the traditional railway transportation systems need more and more time to transfer materials and as a result efficiency do not attain at the desired level. There are provisions for special wagon movement carrying with railway materials, but this wagon reach to its goals like Parbatipur and Saidpur after 15 to 20 days it start journey. So transportation system should be improved to support the system in time.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

CHAPTER - 6

Recommendations and Conclusion

6.1 RECOMMENDATIONS:

Based on the above discussion the following steps may be taken for improvement of the inventory system of Bangladesh Railway:

- Computerized inventory system to be introduced. On-line transaction for receipt and issue of the materials can help the management to achieve its desire goals. It also reduces operation cost of the inventory. The experience of computerization system for diesel spares may be an example for this improvement. This system will reduce inventory volume as well as reduce surplus materials.

- Assessment process plays a vital role for proper maintaining of inventory in Bangladesh Railway. Assessment process and tools are the main weapons for controlling inventory. Management considering various factors relating materials collection processes introduces a formula, which leads to calculate the quantity to be required for future. From the earlier chapter (chapter-4), it is found that in existing system, there is a safety/minimum stock of one year equivalent consumption. Management urged for such high level of safety stocks, is that major portion of the spares come from abroad and the procurement system of the government organization are not realistic considering the present era. Now a days man do not want to spend time for fruitless work, where as they spend this time in an innovative work. But in a Government organization, the system does not trust people, whereas trust can make the system easier and reduce operating time and can reduce safety stock. On the contrary, In Bangladesh Railway, lead-time is set as 9 months equivalent consumption. It also seems too high comparing the present communication system. If it can reduce both the minimum stock level and lead-time then desired result might be achieved. So here it is suggested to reduce safety factor and make lead-time realistic.

- For every case it is found that demand is created as per actual consumption. But this consumption does not remain same at the time when materials will come. As a result

there may be surplus or shortage or overstocked. This assessment system is appropriate only where all materials are available in the local market. Most of the developed countries are not using the system in their organization. This system is better but not best. Now a day some large company are assessing requirement based on output requirement. The marketing division places their demands earlier month and year wise and based on this requirement, the need for raw materials and spares are assessed and demand placed. A certain period back output requirement is determined and based on that requirement raw materials need for future time period can be determined and this system can help to assess accurate demand. In Bangladesh Railway, especially in locomotive heavy schedule, i.e. General Overhaul causes this program basis requirement is adopt. Here spares needed for GOH is earlier defined and maintenance programs for locomotives are submitted to the inventory department minimum 18 months before the maintenance program start. Then the inventory department place demand for procurement to the purchase department based on kit list and program. In this case present stock and dues (Purchase indent and purchase order) of every materials are considered, so that they not be surplus. So here it is suggested for place requirement on the advance program basis.

- Above described system of materials procurement can bring better result to control inventory and maintain it at its desired level. The Kit List of component are not accurate so much and for that materials requirement are not proper, some materials remain surplus and for want of some other maintenance program are hampered. First we have to update the kit list of component. Then Railway has to introduce i*n* every sector of production program based production system. Then assessment will be more accurate and inventory will be at its optimal level. Present stocking system will have to improve. It should be introduce location code for every item of general depot as in the diesel depot. The diesel depot's existing location code should make update so that every: materials be available at its designated location. For oil and liquid materials, the custodian should follow the FIFO (First in First Out) system, so that old oil can not be leakage causing a loss of revenue.

- The custodian should be careful about materials and observe the materials regularly, so that it can not be rusted and become useless. The custodian plays a vital role for

being surplus of materials and alternate use of materials. Observing the consumption rate, the custodian can make attention of the authority regarding further procurement of the same.

- Inventory controlling tools are not working properly in Bangladesh Railway. Regular watching and sudden visit to the stocking depot can improve the inventory situation. Besides, when demands to procure the materials are raised, then the management should careful and cautious at the time of verifying the demand. At the time of verifying demand, the top management should sometimes cross check the demand explained argument in favor of the demand.

- For improvement of the existing procurement system, the main area for improvement of the purchasing system is to be cordial and sincerity of the employee those who are engaged in purchase process. Delay in purchasing is one of the prior causes for inefficiency in inventory control.

- As quality control plays a vital role for inventory control, so, here there is a lot of scope for improvement of quality control department. As quality spares increase the life of finished product, hence improvement of the quality department increase the efficiency of the inventory department.

6.2 CONCLUSION:

The problems inherent in the inventory sector of Bangladesh Railway have been developing over many years. Bangladesh Railway and the Government have sponsored some reforms to bring the situation under control. The economic condition of Bangladesh Railway is not good. In this situation huge blockage of inventory leads the organization to an unprofitable sector. Every year the organization facing remarkable amounts of financial loss. Huge involvement in inventory sector is one of the major causes of this loss. It is obligatory for the organization to minimize the inventory level at its desired level.

Inefficiency in inventory control causes a huge loss for an organization. At present some advanced countries are thinking for zero inventories for production. But for any unavoidable situation this inventory can not support for uninterrupted production system. Any delay of supplying raw materials it may cause stop of whole production system. The world famous Japanese company, Toyota applied zero inventories to reduce its inventory cost as well as production cost. But due to accident of the brake section, production of brake suspended and for wants of brake the production of Toyota suspended for a few days and this caused a huge loss of the company. The loss due to this incident was more than the inventory cost of different spares. From that experience each and every company maintains an inventory level but this level must be within a satisfactory level. For continuous maintenance or production, some inventory is very much essential. The management's function is to maintain the level of inventory at a desired level. For that almost every organization have inventory and there is inventory control wing to control the inventory.

Bangladesh is a poor country and it has no much industry and for that all the spares needed for Bangladesh Railway are not available in the Bangladeshi local market. As a result major portion of the spares have to be imported from abroad. Here zero level inventories are totally impossible. There are several factors in between demand placing and importing and receiving materials. If one of the factors does not work properly then the whole system suffer a lot. In the present situation in Bangladesh Railway, inventory can not be avoided; rather we can try to maintain the inventory at its optimal level.

It can be concluded from the financial picture depicted in the analysis part of the report that there were no definite controlling guidelines for over inventory, proper stocking of materials and arrangement for procuring materials. Proper controlling, supervision and re-adjustment of assessing tools can help to achieve the requirement Quality of goods can help to provide quality maintenance of equipment, locomotives and carriage that ensure trouble free customer service.

In short we can conclude that inventory management is now goal oriented. Modern technology is now available for handling inventory properly and effectively than previous. Computerized inventory system can bring a fruitful result, and it is the experience of Bangladesh Railway also. Railway possesses a better communication system, with the help of that communication system BR can provide on-line transaction for inventory which leads the organization to run with minimum inventory.

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